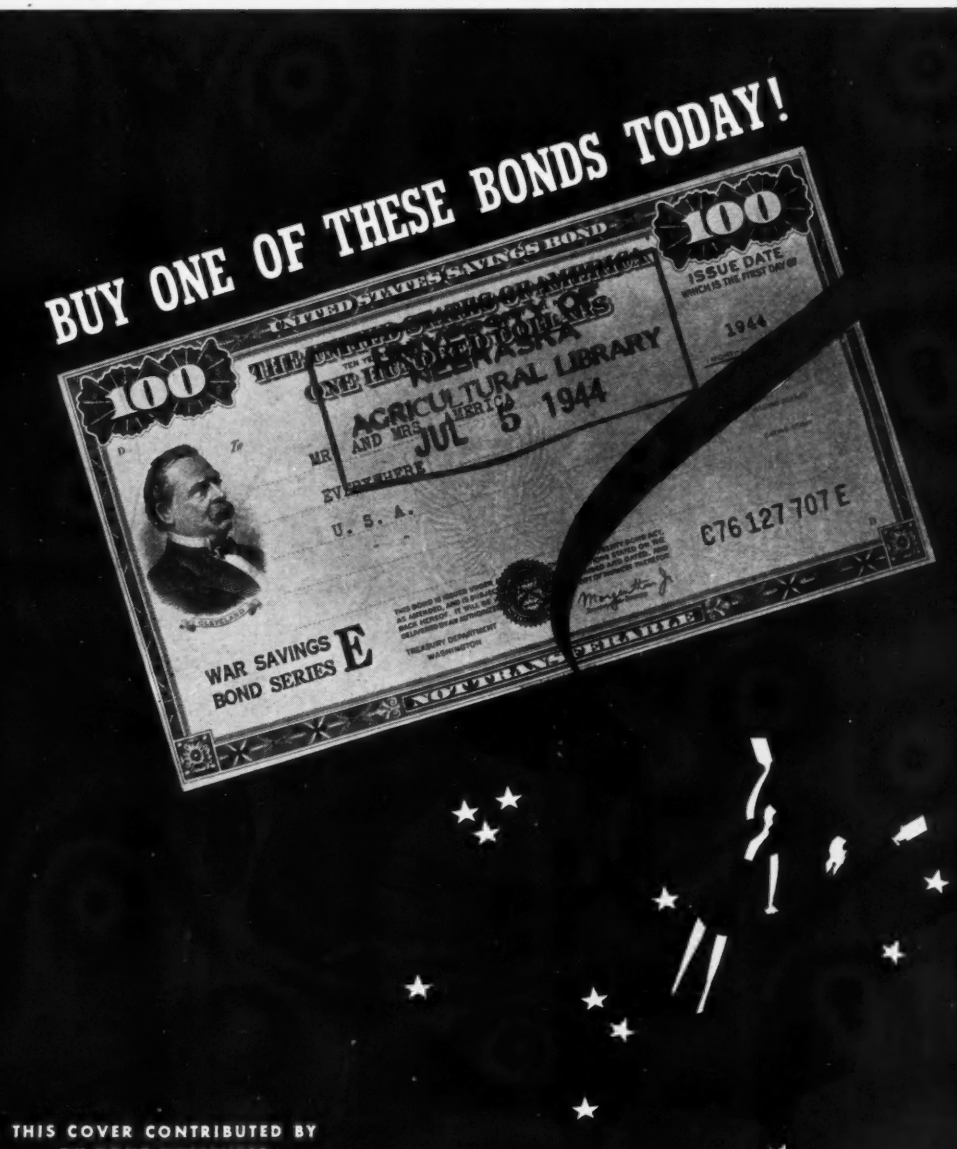
evoted to
EXTILE
HEMISTRY
LEACHING
DYEING
RINTING
NISHING

NE 19, 1944
UME 33, No. 13

AMERICAN

DYESTUFF REPORTER



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DU PONT DYESTUFFS

DU PONT DYESTUFFS

AL PUBLICATION
of the
ROCEEDINGS
AN ASSOCIATION
EXTILE CHEMISTS
D COLORISTS

DURABILITY

Crease-proof and Curable Resin Finished Goods demand dyestuffs with DURABILITY.

The ALTHOUSE CHEMICAL CO. has developed a complete line of DYES which become both LIGHT and WASH FAST with Urea-Formaldehyde and other curable resin finishes.

Let us demonstrate their superiority.

ALTHOUSE CHEMICAL CO.
READING PA.

LEVELENE*

FREE FLOWING, NON-JELLING

More than a trade name.

A penetrant and levelling medium for direct, union, and CELANESE* dyes.

Effective either for stripping or for level dyeing when working with many of the vat type dyes.

A stable, dispersing penetrant for rotproof and mildewproof processing.

Economical and labor saving.

RATHER than ask for a laboratory sample—HAVE one of our technical men bring with him a sufficient quantity for a practical mill run. THEN judge for yourself as many mills have done and profited thereby.

*Reg. U.S. Pat. Off.

AMERICAN ANILINE PRODUCTS, INC.
50 UNION SQUARE — NEW YORK, N. Y.

— Dyestuffs —
Plant: Lock Haven, Pa.

BRANCHES

Providence, R. I.
55 Pine Street

Philadelphia, Pa.
210 N. 13th Street

Toronto, Can.
Dominion Anilines & Chemicals, Ltd.
265 Adelaide Street West

Boston, Mass.
190 High Street

Chicago, Ill.
820 South Clinton Street

Charlotte, N. C.
301 East Seventh Street

*Reg. U. S. Pat. Off.

Los Angeles, Cal. — 1019 South Grand Avenue

American Dyestuff Reporter, Vol. 33, No. 13. June 19, 1944. Published every other Monday. Copyright 1944, by Howes Publishing Co., 440 4th Ave., New York, 16, N. Y. Domestic subscriptions, $5.00; Canadian, $6.00; Foreign, $6.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y. Post Office, under the act of March 3, 1879.

USEFUL FACTS ABOUT HOOKER BLEACHING POWDER

for

- BLEACHING COTTON AND LINEN FIBRE
- MANUFACTURE OF DYE INTERMEDIATES

HOOKER SPECIFICATIONS

FORMULA — $CaO \cdot 2\,CaOCl_2 \cdot 3H_2O$ *(Approximate)*

DESCRIPTION — A white powder with chlorine odor. Contains at least 35% available chlorine when shipped.

FORM — Lumps and powder.

SOLUBILITY—Water-soluble; Ether-insoluble; Alcohol-Reacts.

SHIPPING CONTAINERS — Drums containing 100, 300 and 800 lbs.

SOLUTION TABLE

Hydrometer Scales at 15° C.=59° F.

DEGREES BAUMÉ	SP. GR.	TWADDELL	GMS. PER LITER OF CHLORINE	LBS. HOOKER BLEACH PER GALLON
0.5	1.0035	0.70	2.100	0.0500
1.0	1.0069	1.38	3.875	0.0924
1.5	1.0105	2.10	5.900	0.1404
2.0	1.0140	2.80	7.950	0.1893
2.5	1.0176	3.52	9.964	0.2372
3.0	1.0212	4.24	12.180	0.2900
3.5	1.0248	4.96	14.200	0.3381
4.0	1.0285	5.70	16.400	0.3901
4.5	1.0322	6.44	18.625	0.4434
5.0	1.0358	7.16	21.000	0.5000
5.5	1.0396	7.92	23.150	0.5510
6.0	1.0434	8.68	25.425	0.6050
6.5	1.0471	9.42	27.600	0.6570
7.0	1.0509	10.18	30.000	0.7140
7.5	1.0548	10.96	32.325	0.7690
8.0	1.0587	11.74	34.860	0.8300
8.5	1.0626	12.52	37.200	0.8850
9.0	1.0665	13.30	39.875	0.9494
9.5	1.0705	14.10	42.450	1.0107
10.0	1.0745	14.90	45.000	1.0710
10.5	1.0785	15.70	47.575	1.1327
11.0	1.0825	16.50	50.200	1.1900
11.5	1.0866	17.32	52.750	1.2556
12.0	1.0907	18.14	55.275	1.3160
12.5	1.0949	18.98	57.850	1.3750
13.0	1.0990	19.80	60.400	1.4381
13.5	1.1032	20.64	62.950	1.4980
14.0	1.1074	21.58	65.600	1.5595
14.5	1.1117	22.34	68.400	1.6280
15.0	1.1160	23.20	71.300	1.6975

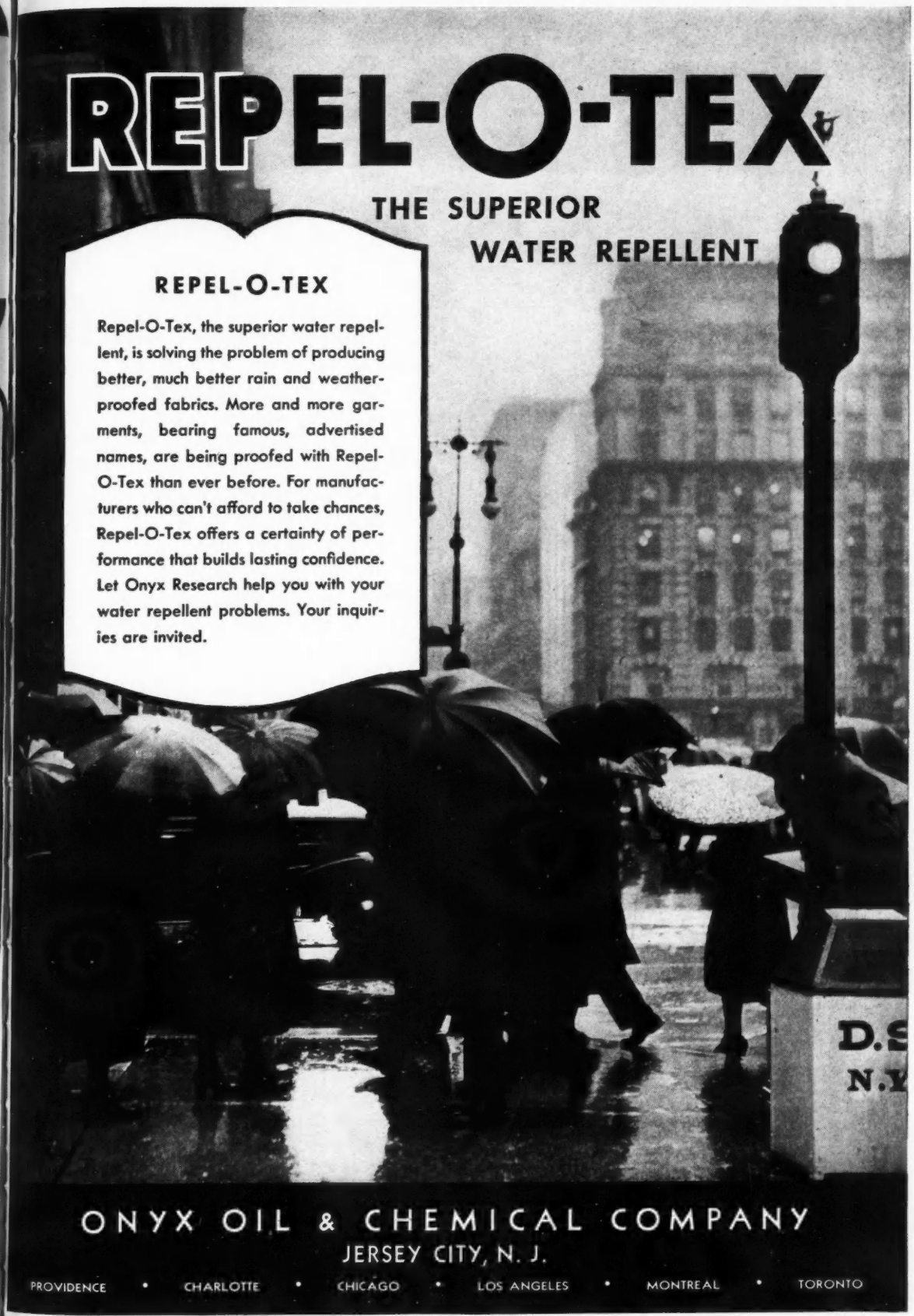
OTHER AVAILABLE HOOKER DYESTUFF CHEMICALS

Aluminum Chloride, Anhydrous • Antimony Trichloride, Anhydrous
Benzal Chloride • Benzotrichloride • Benzoyl Chloride • Benzyl Chloride
Chlor Anisidine • 2:5 Dichlor Aniline • Metanitrobenzoyl Chloride
Monochlorbenzene • Monochlortoluene • Orthodichlorbenzene
Paranitrobenzoyl Chloride • Phosgene • Thionyl Chloride
Trichlorobenzene 1:2:4

HOOKER ELECTROCHEMICAL CO.
2 Forty-Seventh St.
NIAGARA FALLS, N. Y.
New York, N. Y. • Tacoma, Wash. • Wilmington, Calif.

ARMY E NAVY

Hooker CHEMICALS


REPEL-O-TEX
THE SUPERIOR
WATER REPELLENT
REPEL-O-TEX
Repel-O-Tex, the superior water repellent, is solving the problem of producing better, much better rain and weather-proofed fabrics. More and more garments, bearing famous, advertised names, are being proofed with Repel-O-Tex than ever before. For manufacturers who can't afford to take chances, Repel-O-Tex offers a certainty of performance that builds lasting confidence. Let Onyx Research help you with your water repellent problems. Your inquiries are invited.
ONYX OIL & CHEMICAL COMPANY
JERSEY CITY, N. J.
PROVIDENCE • CHARLOTTE • CHICAGO • LOS ANGELES • MONTREAL • TORONTO

Some Girls use them for Walking.

Whether she uses them for posing or pushing, every woman counts on her legs for more than walking. Because she knows the potency of properly sheathed underpinnings, she's extremely critical of today's hosiery. Rayon, cotton, lisle . . . all must have the proper soft, sheer smoky dullness or they're "out."

For thirty-seven years Fancourt chemists have helped hosiery makers and dyers to satisfy the most beautiful legs in the world . . . the American girls'. Today, with the job harder than ever before, our staff is working night and day to develop formulae for handling all types of new problem-materials. A talk with one of our field men will convince you that we have not worked in vain.

NANCY LEE

Attractive photographer's model who posed for this ad says—"All women are models at heart. They love to pose and like professional models, they know that legs are an important part of their charm equipment. That's why they're so critical of today's hosiery."

W. F. FANCOURT & CO.

Phila., Pa., Solving Finishing Problems Since 1904 • In the South, Howard A. Virkler, Greensboro, N. C.

THE FINEST AND MOST DURABLE DYESTUFFS KNOWN

General Dyestuff Corporation

G. I. now — but just wait . .

Wham! and a 30-ton bomber hits the runway at 100 miles an hour! What a beating those huge tires take—and they must take it over and over again.

Hard to believe, for those who think of rayon in terms of dresses and whispy underthings, but inside many of those tires you'll find * TYRON *—a "Continuous Process" rayon especially developed for tire manufacture.*

You see, Industrial's "Continuous Process" machines, that have been making the famous *Spun-lo *textile-size yarns for better fabrics, lend themselves admirably to the manufacture of superior tire yarn and tire cord fabric.*

Today, our ever-increasing production of this yarn is reserved for war uses, to keep our bombers and fighter planes, trucks and jeeps a-rolling on to Victory. Imagine, when yarn of this quality will be available again for civilian uses—what a galaxy of new and superior fabrics and textiles will be yours tomorrow!

Industrial
RAYON CORPORATION
MAKERS OF
Spun-lo RAYON YARN
BY THE *Continuous Process*

*Reg. U. S. Pat. Off.

CLEVELAND, OHIO • NEW YORK OFFICE, 500 FIFTH AVENUE

Ideas for your Notebook.. from CARBIDE AND CARBON CHEMICALS CORPORATION

"Tergitol" Penetrants are powerful wetting agents...

Have you investigated these detergents in your operations?

THE chemical stability of "Tergitol" penetrants permits them to be used under conditions where many wetting agents break down. All "Tergitol" penetrants are sufficiently soluble in commercial solutions of acids, alkalies, or salts to give rapid wetting action. These penetrants are effective in hard water, because they form water-soluble calcium and magnesium salts. They also aid in the dispersion of lime soaps, thereby reducing the formation of curds in hard water. Some specific uses in textile operations are outlined at the right.

To meet the wide variety of conditions encountered, there are *three* "Tergitol" penetrants from which you may choose the one best suited to your particular operations. It is important to base your choice on the content of dissolved materials rather than on the pH value of the solution.

"TERGITOL" PENETRANT 7 . . . sodium heptadecyl sulfate . . . a wetting agent of general utility—for use in solutions which contain a low concentration of dissolved materials; that is, less than 1.0 per cent of acids, alkalies, salts, dyestuffs, or starches. Under such conditions, it is one of the most powerful of the commercial wetting agents. Most of the production of this material is reserved for war-essential uses.

"TERGITOL" PENETRANT 4 . . . sodium tetradecyl sulfate . . . is a superior wetting agent in moderately concentrated solutions. In those containing 1 to 5 per cent dissolved acids, bases, or salts, "Tergitol" penetrant 4 has been found to be most effective.

"TERGITOL" PENETRANT 08 . . . sodium ethylhexyl sulfate . . . Because of its greater solubility, chemical stability, and penetrative action in very strong acid or alkaline solutions containing more than 5 per cent of dissolved materials, "Tergitol" penetrant 08 is a remarkable assistant in mercerizing, carbonizing, and other applications involving high concentrations of dissolved materials.

Which "Tergitol" Penetrant Can You Use?

For further information on "Tergitol" penetrants, write:

CARBIDE AND CARBON CHEMICALS CORPORATION
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC **New York 17, N. Y.**

Kier-Boiling . . . In addition to rapid wetting in tightly packed kiers, a uniform boil-out and an even bottom are produced when "Tergitol" penetrant 7 is used.

Mercerizing . . . Only 0.1 per cent of "Tergitol" penetrant 08 promotes rapid mercerizing of dry, grey stock and induces desirable shrinkage characteristics. It withstands the rigorous treatment encountered during concentration of used mercerizing liquors.

Bleaching . . . "Tergitol" penetrant 4 is stable in hypochlorite and peroxide bleach liquors and is not exhausted readily. It permits bleaching without preliminary boiling-out.

Dyeing . . . Less than 0.1 per cent (of the bath weight) of "Tergitol" penetrant 7 not only uniformly wets out the fibers in the dye bath, but also aids in evenly dispersing the dyestuff itself. Intensified colors as well as rapid and level dyeing are obtained.

Scouring . . . "Tergitol" penetrants are good detergents and enhance the action of the alkaline solutions used in scouring.

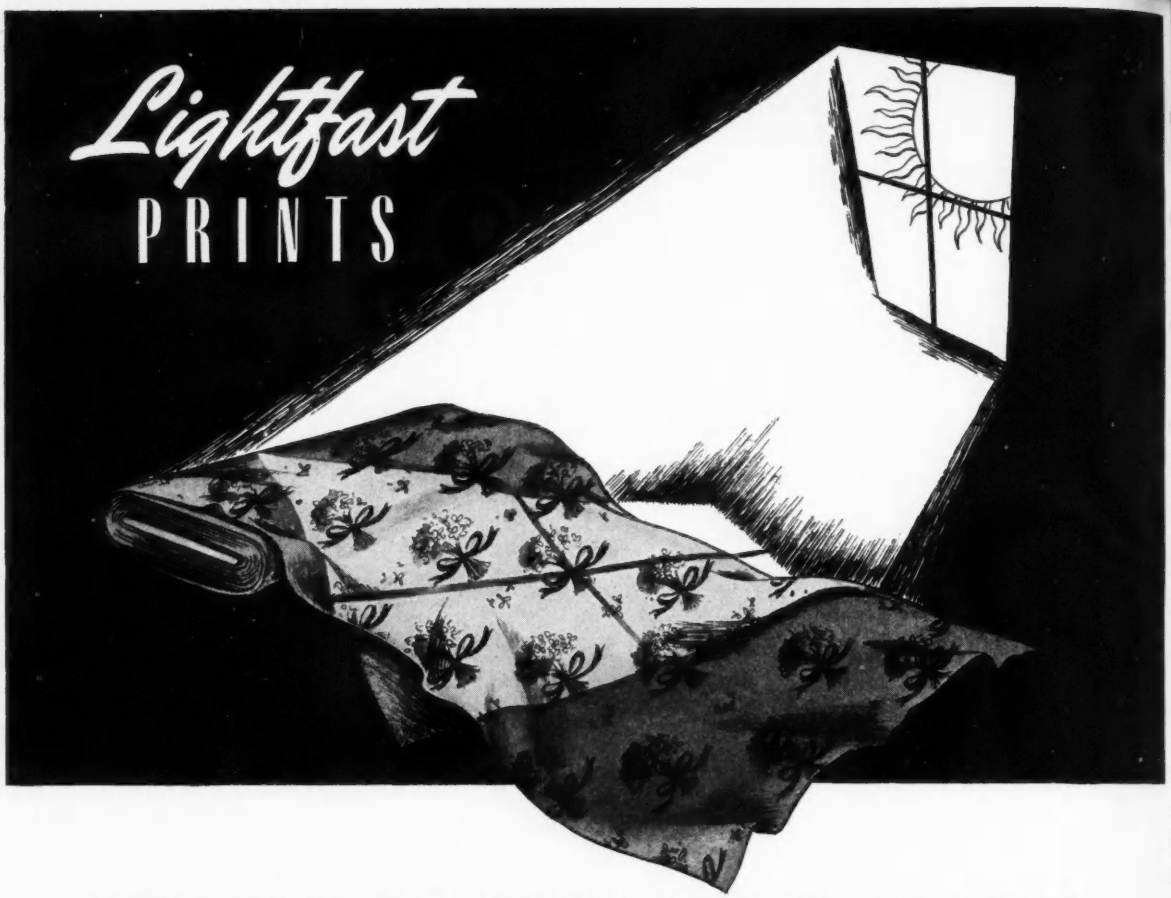
Carbonizing . . . "Tergitol" penetrant 4 effects uniform absorption of acid or aluminum chloride by wool. It will not decompose, vaporize, or stain during the drying and baking, and does not cause injurious after effects.

Sizing . . . Starches are more readily dissolved in water containing "Tergitol" penetrant 7. The resultant size will impregnate evenly and rapidly. "Tergitol" penetrant 7 remains in the size, thus assisting in the subsequent desizing and dyeing.

Finishing . . . "Tergitol" penetrants are used in resin dispersions for permanent stiffening, water-proofing, anti-slip characteristics, pigment-coloring, and flame-proofing. They are helpful in gaining rapid, uniform penetration of mildew-proofing solutions.

PRODUCERS OF SYNTHETIC ORGANIC CHEMICALS

The word "Tergitol" is a registered trade-mark of Carbide and Carbon Chemicals Corporation.



ARIDYE COLORS ARE AVAILABLE, INCLUDING LIGHT SHADES, WHICH WITHSTAND 300 FADEOMETER HOURS WITHOUT LET DOWN!

Lightfastness is one of the outstanding characteristics of Aridye* pigment-printing colors. Most pigments are reasonably lightfast. When lightfastness is *extremely* important, certain Aridye colors may be selected which, even in light tints, will withstand 300 fadeometer hours without let down!

In washfastness, Aridye pigment-printing colors meet accepted standards of the textile industry. By careful selection of technically correct pigments and binders, Aridye colors have been formulated to bond with textile fibers so firmly as to pass the most severe Launderometer and scrub tests.

For ease of application pigment colors have no equal—they permit the colorist to work with fully developed colors requiring no after-treatment. Because of their uniformity and their ability to wet quickly both metal and fibers, they assure a sharp, even mark and *exact* reproduction of the engraving.

For complete information about Aridye pigment-printing colors, or for technical assistance in their application—write to Aridye Corporation, a subsidiary of Interchemical Corporation, Fair Lawn, New Jersey.

Pioneering WITH *Pigments*

—one of a series of developments illustrating the advantages of Aridye* pigmented colors in a wide variety of applications

A wide range of Aridye pigment-printing colors can be supplied under M-103. In addition, there are 13 extremely lightfast colors that are still available without any restrictions.

Aridye *Reg. U. S. Pat. Off.

TEXTILE COLORING MATERIALS

ARIDYE CORPORATION • A SUBSIDIARY OF INTERCHEMICAL CORPORATION • FAIR LAWN, N. J. • ROCK HILL, S. C. • PROVIDENCE, R. I.

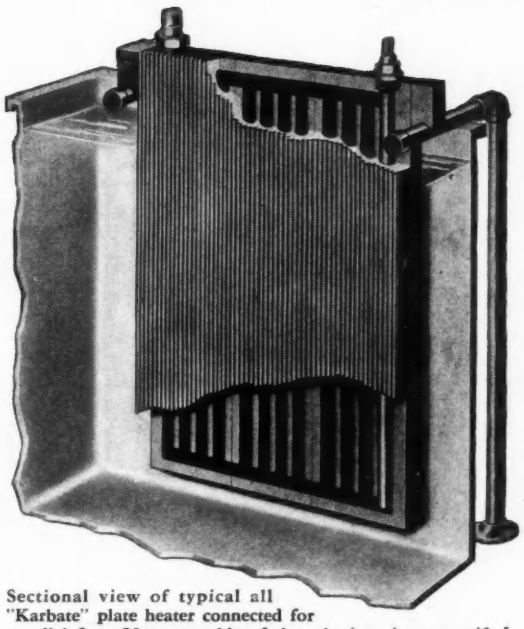
For Greater Serviceability

KARBATE

TRADE-MARK

PLATE HEATER

The "Karbate" Plate Heater is a new departure in heaters for pickling tanks, plating tanks or other services where heating, or cooling, of corrosive liquids is required. For greater serviceability through increased resistance to mechanical shock, special construction combines tubular channels in unit blocks of "Karbate" corrosion-resistant material.



Sectional view of typical all "Karbate" plate heater connected for parallel flow. Note assembly of three basic units to specified size and "Karbate" shoulders for support of heater. Other types of supports are available.

Features of the "KARBATE" Plate Heater

- **"Karbate" material is chemically inert . . . resists practically all acids, alkalies and solvents.**
- **Thermal conductivity of "Karbate" equipment is higher than that of most materials used for such installations.**
- **Fluted sides utilize principles of extended surface for greater heat transfer.**
- **Channels can be arranged in parallel or series flow for heating or *cooling* liquids.**
- **No dilution of tank contents.**
- **Sturdy construction minimizes maintenance costs.**

The "Karbate" Plate Heater is available in four separate design groups and 30 different combinations to meet almost any service requirement. Our representative will be glad to furnish details. Write National Carbon Company, Inc., Cleveland 1, Ohio, Dept. 41F.

The registered trade-mark "Karbate" distinguishes products of National Carbon Company, Inc.

★

BUY UNITED STATES WAR BONDS

★

NATIONAL CARBON COMPANY, INC.

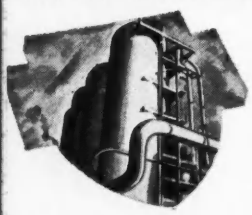
Unit of Union Carbide and Carbon Corporation

UCC

CARBON PRODUCTS DIVISION, Cleveland 1, Ohio, New York, Pittsburgh, Chicago, San Francisco

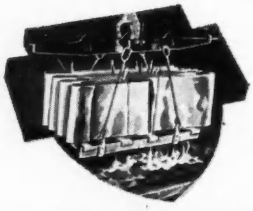
GENERAL CHEMICAL

AGAIN GENERAL CHEMICAL CREATES NEW FACILITIES FOR SULFURIC ACID TO SERVE AMERICAN INDUSTRY

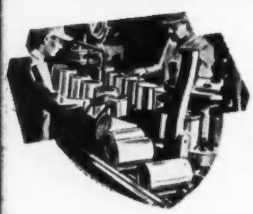


Petroleum
Alkylation, sulfonation, and improving color, odor, and stability of petroleum products.

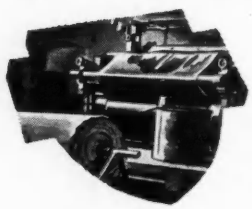
Rayon
Used in the spinning bath in rayon manufacture.



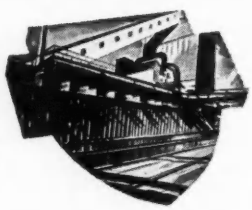
Steel
For pickling of steel sheets and castings; removes oxides and scales.



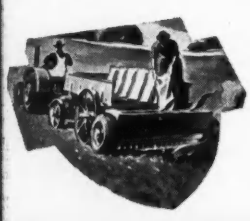
Paints
Raw material in production of pigments; for sulfonating drying oils.



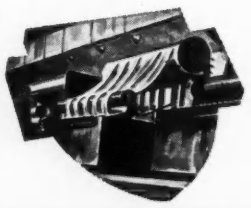
Sulfonation
Sulfonating vegetable oils for water, fire, and mildew-proofing fabrics and textiles.



Coke By-Products
For washing toluene and benzene, raw materials for dyestuffs and explosives.



Fertilizers
Used in super phosphate and ammonium sulfate production.



Textiles
For carbonizing wools and for the dyeing bath in production of textiles.

GRADES OR STRENGTHS

Standard: From 60° Baume to 65% Oleum (114.6% H_2SO_4)

Special High Purity:

Diamond—66° Baume, Carboys Only

Crystal —66° Baume, 98% H_2SO_4

From Carboys to Tank Cars & Barges

RECENTLY RELEASED: New technical information on physical and chemical properties of Fluosulfonic Acid. Write nearest Technical Service office for Bulletin 33A.

GENERAL CHEMICAL COMPANY

40 RECTOR STREET NEW YORK 6, N. Y.

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Pacific Coast Technical Service Offices: Los Angeles · San Francisco · Seattle, Wenatchee and Yakima (Wash.)

In Canada: The British Chemical Company, Limited · Montreal · Toronto · Vancouver

in WAR or PEACE

ARKANSAS PRODUCTS *Serve Dependably*

FUNGICIDE: A mildew proofer made in various types to meet all government specifications.

ARKO FIRE RETARDENT: For flame-proofing uniform cloth, felt and all types of rayon and cotton fabrics including theatrical drapes.

***AQUAROL:** A water repellent for uniforms, overcoatings and other military fabrics; also all civilian garment cloth.

***PARAMINE:** A cation active softener for processing cotton and rayon cloth to obtain a soft, smooth, pleasing finish.

***ALGEPON P.:** A retarding agent for vat and sulphur dyeing to prevent premature oxidation of the dye-stuff or in other processes when necessary to retard exhaustion to obtain a uniform shade.

***PARAPON S. A.:** A highly efficient leveller and softener used in dyeing and finishing all types of viscose and acetate rayon. Excellent for processing tricot cloth.

ARKOLA G.: For finishing rayons to impart a full, better feeling hand and additional weight. An excellent substitute for glycerine for printing and finishing.

***CULOFIX:** Used as an after treatment in last rinse to prevent bleeding of direct dyed cotton or rayon in water.

***DIAZONOL A. C.:** For boiling out cotton cloth in pressure or open kiers to produce greater absorbency and cleaner material. Excellent for preboiling knitted cloth in preparation for chlorine bleach. Also used with good results for boiling out cotton or rayon cloth in the jig.

And a Complete Line of Oils, Chemicals, Softeners and Finishes
For Wet Processing All Textile Fibres

*Reg. U.S. Pat. Off.

ARKANSAS CO. INC., NEWARK, N. J.

Established 40 years

Here's one manufacturer's experience. He encountered considerable static on acetate staple fiber and tried Stantex 629 by spraying acetate laps with a 1% watery emulsion. This resulted in increased production from his normal 38½-yard laps to 56 yard laps.

Before using Stantex 629 the laps were like a 'feather bed,' swelling up enormously and falling together in a lump on standing, making processing very difficult. When Stantex 629 was used, this manufacturer not only produced 56-yard laps but also saved considerable in labor and the breaking strength of the yarn increased from 64 pounds to 71 pounds. If you have a similar problem investigate the advantages offered by Stantex 629. Samples are available upon request.

STANDARD CHEMICAL PRODUCTS, Inc.

HIGH POINT, N. C. CHATTANOOGA, TENN. PROVIDENCE, R. I.

13th and JEFFERSON STREETS, HOBOKEN, NEW JERSEY

ANDOVER, MASS. PATERSON, N. J. SACRAMENTO, CAL.

WASH FAST when the printed or dyed cloth is dried . . . eliminates curing.

DRY PRODUCT . . . easy to handle . . . saves shipping and storage space.

NO SOLVENT . . . does not damage rubber blankets.

ANY OTHER TYPES of COLOR can be used because the paste is made up with water.

WIDE PIGMENT CHOICE . . . you can select your pigment colors from several sources of supply.

SHO-PAL is being used successfully by many textile plants for

High Quality Results at Low Cost

Prove these values for yourself.
Order a trial lot of Sho-Pal today.

78 YEARS OF STARCH SERVICE

STEIN SH HALL

285 MADISON AVENUE • NEW YORK 17, N. Y.
2841 SOUTH ASHLAND AVENUE • CHICAGO 8, ILL.
250 VAN HORNE STREET • TORONTO, CANADA

LABORATORIES AT: NEW YORK
CHICAGO • CHARLOTTE • PROVIDENCE
LONG ISLAND CITY, N. Y.

EST. 1866

A TEXTILE STARCH FOR EVERY TEXTILE PURPOSE

EFFICIENCY—
SAFETY—
SPEED

YOU GET ALL 3 WITH OLATE PROCESSING

Whatever fibers or combination of fibers you are processing today, you can count on Olate for an outstanding job. This pure, neutral, low titer soap is tops in efficiency, safety and speed.

WOOLENS?

Olate's excellent emulsifying and lubricating properties provide safe, thorough fulling and scouring results. Fluid Olate solutions offer unusual protection against uneven shrinkage and non-uniform fulling. Fabrics come through Olate processing clean and sweet-smelling.

RAYONS AND ACETATES?

Olate's gentleness is an important factor in good scouring and dyeing results on these synthetic fibers and fabrics. Olate offers generous protection against streaks and dye blotches.

Wartime production schedules leave no room for processing mistakes. That is one big reason why so many outstanding textile mills today are depending upon Olate to help assure a smooth, uninterrupted flow of saleable goods.

Olate—Safe and efficient for every textile soap usage

PROCTER & GAMBLE

"The Mark of Merit"

★
BUY BONDS
TO HAVE
AND
TO HOLD
★

This is a pre-view of the post-war, "tag of certification" that will identify PERMA-CIDE treated materials when the product is available for civilian use.

Reports of investigations conducted by recognized independent laboratories are available to Government contractors and those now planning post-war merchandising programs.

REFINED PRODUCTS COMPANY

Lyndhurst • New Jersey

New England Representative: E. L. LEGG, P. O. Box 597, Providence, R. I.
Canadian Selling Agents: BERKELEY PRODUCTS CANADA, LTD., 41 Hillcrest Avenue, St. Catharines, Ontario, Canada

PERMA-CIDE · PERMA-TERGE · PERMA FIX · PERMA WET · PERMA PAR R · PERMA PAR K · PERMA PAR SOL · VAPOLINE · VELVAMINE K-90 · PERMA-SET

PRICE CUT

You can cut the price you pay for water repellents in one of two ways. You can pay a lower initial price, if you can get it. Or, you can pay a reduced final price, if you can get it.

For example, if you use a water repellent that helps your sales, then, such a repellent, when all the costs are in, will cost you less than one that doesn't help your sales very much.

Initially, the cost of "Cravenette" water repellents is comparable with that of ordinary repellents; but everyone, everywhere knows "Cravenette"; it means more, a great deal more, when you come to sell your fabrics. Why not give yourself that benefit?

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"Sitting Ducks" for Snipers

Against the jungle background, the white underwear of the first American Troops in the South Pacific, made them "sitting ducks" for Jap snipers.

For quick protection they resorted to homemade dyes concocted from coffee grounds, root juices . . . anything to simulate O.D. camouflage. Soon direct dyes were made available for re-dyeing in emergency field equipment, in Army mobile laundries, aboard ship. All old-issue "whites" were quickly made inconspicuous . . . even the traditional white of the nurses uniforms gave way to low-visibility olive drab. Thereupon, the QMC made O.D. the official shade for all G.I. underwear.

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JUNE 19, 1944

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Members should notify the **Secretary** immediately of all address changes.

Resistance of Fabrics and Yarns to INSECT PESTS

J. ROBERT BONNAR

Technical Director, General Dyestuff Corp.

ON December 3, 1943, in the office of General Dyestuff Corporation, 435 Hudson Street, New York, New York, a meeting was held of the parties who had participated in the cooperative tests run during the past ten months by members of the various committees on tests for "Resistance of Fabrics and Yarns to Insect Pests." Those present represented the committees of the A.A.T.C.C. (American Association of Textile Chemists and Colorists), the A.S.T.M. (American Society for Testing Materials) and the N.A.I.D.M. (National Association of Insecticide and Disinfectant Manufacturers). Those present were:

J. Robert Bonnar, Chairman, A.A.T.C.C. (Presiding), General Dyestuff Corporation, 435 Hudson Street, New York

F. W. Fletcher, Chairman, N.A.I.D.M., The Dow Chemical Company, Midland, Michigan

K. H. Barnard, Chairman, A.S.T.M., Pacific Mills, 1 W. Central Avenue, East Newark, New Jersey

Mrs. W. N. Pardey, General Dyestuff Corporation, 435 Hudson Street, New York

Miss D. Houghton, Teachers' College, Columbia University, New York

*Member of Executive Committee on Research; Acting Chairman of Sub-committee B-4 of Committee D-13, A.S.T.M.

RESUME OF ALL TESTS

EXCREMENT WEIGHT METHOD—BLACK CARPET BEETLE

	Untreated			*Treated with —Non-Permanent Type Resistant—*			*Treated with —Permanent Type Resistant—*		
Material	*Average of Each Cooperator's Average*	*Deviation of Averages*	*% Deviation of Averages*	*Average of Each Cooperator's Average*	*Deviation of Averages*	*% Deviation of Averages*	*Average of Each Cooperator's Average*	*Deviation of Averages*	*% Deviation of Averages*
Broadcloth	21.2	6.7	31.6	3.6	1.5	41.7	3.9	1.4	35.9
Men's Suiting	31.6	9.8	31.0	3.2	0.8	25.0	5.4	1.5	27.8
Dress Goods	28.7	9.9	34.5	3.4	0.7	20.6	5.1	2.1	41.2
Carpet	25.9	10.0	38.6	...	...	...	5.8	1.7	29.3
Knitting Yarn	25.3	7.2	28.5	3.9	1.1	28.2	4.4	1.1	25.0
Carpet Yarn	26.0	9.1	35.0	3.3	1.0	30.3	3.8	1.0	26.4
Blanket	28.0	11.7	41.8	3.3	1.3	39.4	4.0	1.5	37.5
Hat Felt	17.6	8.6	43.2	3.1	1.3	41.9	3.3	1.1	33.3
Sweater	22.0	7.0	31.8	2.9	1.1	37.9	3.2	1.3	40.6
				(12 cooperators)					

FABRIC LOSS METHOD—BLACK CARPET BEETLE

Broadcloth	48.2	21.2	44.0	7.9	10.6	134.2	14.8	13.5	91.2
Men's Suiting	45.4	14.9	32.8	4.3	6.6	153.5	11.0	11.4	103.7
Dress Goods	47.8	14.3	29.9	12.7	13.3	104.7	15.8	12.6	79.7
Carpet	71.5	20.5	28.7	...	...	...	29.8	25.7	86.2
Knitting Yarn	53.4	18.4	34.5	11.6	10.8	93.1	14.5	13.3	91.7
Carpet Yarn	59.1	24.0	40.6	12.4	13.7	110.5	15.3	12.7	83.0
Blanket	60.7	23.9	39.4	11.1	17.3	155.9	17.6	19.7	111.4
Hat Felt	33.5	15.6	43.6	7.9	9.0	113.9	11.1	10.5	94.6
Sweater	39.8	12.7	31.9	6.5	8.9	137.5	8.1	9.3	114.8
				(12 cooperators)					

FABRIC LOSS METHOD—WEBBING CLOTHES MOTH

	Untreated			*Treated with —Non-Permanent Type Resistant—*			*Treated with —Permanent Type Resistant—*		
Material	*Average of Each Cooperator's Average*	*Deviation of Averages*	*% Deviation of Averages*	*Average of Each Cooperator's Average*	*Deviation of Averages*	*% Deviation of Averages*	*Average of Each Cooperator's Average*	*Deviation of Averages*	*% Deviation of Averages*
Broadcloth	62.5	17.0	27.2	2.9	6.6	227.6	5.7	10.1	177.2
Men's Suiting	43.8	0.8	1.8	24.3	19.8	81.5	8.7	8.0	92.0
Dress Goods	74.2	2.9	3.9	7.7	4.5	58.4	15.4	6.3	40.9
Carpet	88.1	27.9	31.7	...	...	...	37.1	18.7	50.4
Knitting Yarn	59.8	32.8	54.8	7.5	4.9	65.3	20.1	7.9	39.3
Carpet Yarn	63.5	34.5	54.3	10.6	8.4	79.2	29.0	14.6	50.3
Blanket	61.0	10.8	17.7	6.3	9.3	147.6	10.2	18.8	184.3
Hat Felt	58.3	16.6	28.4	2.8	6.9	249.3	22.4	10.4	46.4
Sweater	56.5	25.3	44.8	2.1	4.1	195.2	10.6	7.9	74.5
				(3 cooperators)					

H. W. Wilde, Merck and Company, Rahway, New Jersey

Charles W. Dorn, J. C. Penney Company, 330 West 34th St., New York

A. J. Kellner, U. S. Testing Company, 1415 Park Ave., Hoboken, New Jersey

F. C. Nelson, Standard Oil of New Jersey, Elizabeth, New Jersey

Lieut. E. F. Monroe, Philadelphia Quartermaster Depot, 2800 South 20th St., Philadelphia, Pa.

About a year ago, after the three abovementioned individual committees had met several times both separately and jointly, the chairmen of the three committees met and decided, as it seemed was wanted by the committees and was needed very badly, to run a set of cooperative tests which would give comparisons on the following:

1. Excrement Weight Method against Fabric Loss Method.
2. The use of either method on different types of resistant treatments. For this comparison samples of untreated fabric as well as samples treated with a non-permanent and a permanent moth resistant were used.
3. The use of test broadcloth as against other types of fabric. For this test the following types of fabric were used:
   1. Broadcloth (Standard Test Cloth)
   2. Men's Suiting
   3. Dress Fabric
   4. Carpet
   5. Knitting Yarn
   6. Carpet Yarn
   7. Blanket
   8. Hat Felt
   9. Knit Sweater

These cooperative tests having been completed, it seemed advisable to sit down and have a round-table discussion concerning what they proved and showed; thus the purpose of the meeting.

After a brief discussion of the charts of the cooperative tests, the group was agreed that the report of visual damage was the only reported damage which held true from laboratory to laboratory. It was agreed that within each laboratory the figures on either Excrement Weight Method or Fabric Loss Method did not vary greatly but that the differences from one laboratory to another were too great for comparison.

The consensus of opinion was that visual damage should be used as the criterion, with the use of either Excrement Weight or Fabric Loss Method tests being used as a check, either method to be used at the discretion of the individual laboratory.

It was felt that some means of uniform

The following is a typical tabulation of tests for all cooperators on one type of material showing individual tests, deviations, averages and % average deviations:

BROADCLOTH (STANDARD TEST CLOTH)

EXCREMENT WEIGHT METHOD—BLACK CARPET BEETLE

Cooperators	*Untreated* Mgs. Excrement	Deviation	*Treated with Non-Permanent Type Repellent* Mgs. Excrement	Deviation	*Treated with Permanent Type Repellent* Mgs. Excrement	Deviation
1.	36.2	0.6	4.4	0.8	7.4	1.8
	33.0	2.6	4.0	0.4	6.6	1.0
	42.1	6.5	4.0	0.4	5.0	0.6
	31.0	4.6	2.0	1.6	3.2	2.4
	35.6 Ave.	3.6 Ave.	3.6 Ave.	0.8 Ave.	5.6 Ave.	1.5 Ave.
	% Ave. Dev. 10.1		% Ave. Dev. 22.2		% Ave. Dev. 26.8	
2.	17.0 Ave. Mgs.		3.0 Ave. Mgs.		3.0 Ave. Mgs.	
3.	18.3	6.5	1.2	0.1	4.2	0.5
	8.1	3.7	0.9	0.4	3.8	0.1
	8.6	3.2	0.9	0.4	4.1	0.4
	12.2	0.4	2.2	0.9	2.8	0.9
	11.8 Ave.	3.5 Ave.	1.3 Ave.	0.5 Ave.	3.7 Ave.	0.5 Ave.
	% Ave. Dev. 29.7		% Ave. Dev. 38.5		% Ave. Dev. 13.5	
4.	12.7	5.8	1.6	0.9	3.0	0.0
	20.1	1.6	2.9	0.4	3.0	0.0
	20.4	1.9	2.1	0.4	3.4	0.4
	20.6	2.1	3.2	0.7	2.7	0.3
	18.5 Ave.	2.9 Ave.	2.5 Ave.	0.6 Ave.	3.0 Ave.	0.2 Ave.
	% Ave. Dev. 15.7		% Ave. Dev. 24.0		% Ave. Dev. 6.6	
5.	23.4	0.8	5.1	0.5	6.8	1.1
	28.1	3.9	4.6	0.0	4.5	1.2
	22.6	1.6	4.0	0.6	5.9	0.2
	22.6	1.6	4.5	0.1	5.5	0.2
	24.2 Ave.	2.0 Ave.	4.6 Ave.	0.3 Ave.	5.7 Ave.	0.7 Ave.
	% Ave. Dev. 8.3		% Ave. Dev. 6.5		% Ave. Dev. 12.3	
6	13.4	0.5	1.7	0.5	1.4	0.8
	13.2	0.3	2.6	0.4	2.0	0.2
	12.0	0.9			2.0	0.2
					3.2	1.0
	12.9 Ave.	0.4 Ave.	2.2 Ave.	0.5 Ave.	2.2 Ave.	0.6 Ave.
	% Ave. Dev. 3.1		% Ave. Dev. 22.7		% Ave. Dev. 27.3	
7.	25.0	4.0	8.0	1.0	2.0	0.8
	24.0	5.0	6.0	1.0	1.0	1.8
	30.0	1.0	6.0	1.0	3.0	0.2
	37.0	8.0	8.0	1.0	5.0	2.2
	29.0 Ave.	4.5 Ave.	7.0 Ave.	1.0 Ave.	2.8 Ave.	1.3 Ave.
	% Ave. Dev. 15.5		% Ave. Dev. 14.3		% Ave. Dev. 46.4	
8.	Ave. Mgs. 15.5		Ave. Mgs. 3.2		Ave. Mgs. 4.9	
9.	Ave. Mgs. 26.0		Ave. Mgs. 4.4		Ave. Mgs. 5.2	
10.	Ave. Mgs. 14.8		Ave. Mgs. 1.2		Ave. Mgs. 1.4	
11.	Ave. Mgs. 28.0		Ave. Mgs. 6.6		Ave. Mgs. 5.9	

(12 cooperators)

reporting of visual damage should be found and Mr. Fletcher of N.A.I.D.M. Committee showed a device which had been used in his laboratory. This device consisted of a dark backing on which the sample is placed, over which is fitted a metal square threaded in different colored yarns to form small squares, each small square representing 1.1% of the size of the test sample. It was attempted to make this so that each square equaled 1%, but the size was slightly off what was planned, and thus the 1.1%. Further work will be done by using a square test specimen of 2 square inches so that a device can more accurately and more easily be made rather than running the test on a circle or disc specimen having 2 square inches of area, which latter, as mentioned, makes it difficult to produce a device for measuring. By counting the squares or parts of squares to as fine as one quarter, the per cent damage can be expressed. Damage would have to be counted and expressed twice, once as to nap and surface damage, and once as to actual holes in the fabric.

The committee decided to make a further study of reporting visual damage in this manner and Mr. Wilde and Mr. Fletcher were named as a subcommittee with the duty of circulating Mr. Wilde's previously tested cooperative samples and Mr. Fletcher's evaluating device to the various members of the committee for their analysis of visual damage on a percentage basis, and thus an idea of how each individual would rate the same samples or tests would be obtained.

There was further discussion on the use of this device for rating pile fabrics and yarns, and the possibility that some other device or means of testing might prove necessary. It was felt by some members that the removal of damaged pile by a gentle brushing or pulling from the front might be allowed, then evaluating by the gadget mentioned above.

It was also felt by some members of the committee that further tests should be run on carpeting, confining the beetles to the back of the carpet and then removing damaged pile from the front.

The group agreed that in testing, a control sample treated with a repellent should be run with each set of tests, this control to be individually chosen by each laboratory.

A suggestion was made that, in writing a new test method, some mention on the toxicity requirements should be made, but the decision was that this did not fall under the jurisdiction of this committee.

Except for a few gaps here and there, complete set of figures was received from each of the cooperators covering the

FABRIC LOSS METHOD—BLACK CARPET BEETLE

Cooperator	*Untreated* Mgs. Loss	Deviation	*Treated with Non-Permanent Type Repellent* Mgs. Loss	Deviation	*Treated with Permanent Type Repellent* Mgs. Loss	Deviation
1.	52.2	14.2	1.6	0.0	5.7	0.6
	30.6	7.4	1.9	0.3	5.2	0.1
	35.2	2.8	1.4	0.2	4.7	0.4
	33.9	4.1	1.4	0.2	4.6	0.5
	38.0 Ave.	7.1 Ave.	1.6 Ave.	0.2 Ave	5.1 Ave.	0.4 Ave.
	% Ave. Dev. 18.7		% Ave. Dev. 12.5		% Ave. Dev. 7.8	
2.	37.0 Ave. Mgs.		13.0 Ave. Mgs.		15.0 Ave. Mgs.	
3.	26.0	6.8	+ 2.4	2.7	2.9	1.6
	13.7	5.5	1.2	6.3	2.7	1.8
	16.7	2.5	0.8	5.9	6.1	1.6
	20.5	1.3	+ 20.0	14.9	6.2	1.7
	19.2 Ave	4.0 Ave.	+ 5.1 Ave.	7.5 Ave.	4.5 Ave.	1.7 Ave.
	% Ave. Dev. 20.8		% Ave. Dev. 147.1		% Ave. Dev. 37.7	
4.	33.8	11.1	16.4	0.7	22.1	1.6
	49.7	4.8	16.6	0.9	22.5	1.2
	46.6	1.7	12.2	3.5	27.4	3.7
	49.5	4.6	17.5	1.8	21.2	2.5
	44.9 Ave.	5.6 Ave.	15.7 Ave.	1.7 Ave	23.7 Ave.	2.3 Ave.
	% Ave. Dev. 12.5		% Ave. Dev. 12.1		%Ave. Dev. 9.7	
5.	105.2	8.4	53.8	0.6	57.8	1.8
	97.4	0.6	52.9	0.3	61.0	1.4
	88.5	8.3	52.9	0.3	60.6	1.0
	96.2	0.6	53.3	0.1	58.8	1.2
	96.8 Ave.	4.5 Ave.	53.2 Ave.	0.3 Ave.	59.6 Ave.	1.4 Ave.
	% Ave. Dev. 4.6		% Ave. Dev. 0.6		% Ave. Dev. 2.3	
6.	30.5	1.7	1.9	0.2	4.7	0.8
	34.7	2.5	2.3	0.2	5.0	0.5
	27.4	4.8	1.5	0.6	6.0	0.5
	36.3	4.1	2.5	0.4	6.4	0.9
	32.2 Ave.	3.3 Ave.	2.1 Ave.	0.4 Ave.	5.5 Ave.	0.7 Ave.
	% Ave. Dev. 10.2		% Ave. Dev. 19.0		% Ave. Dev. 12.8	
7.	25.0	19.8	+ 4.0	3.2	+ 6.0	4.5
	29.0	15.8	+ 11.0	3.8	+ 14.0	3.5
	30.0	14.8	+ 12.0	4.8	+ 15.0	4.5
	51.0	6.2	+ 2.0	5.2	+ 7.0	3.5
	44.8 Ave	14.2 Ave.	+7.2 Ave.	4.2 Ave.	+10.5 Ave.	4.0 Ave.
	% Ave. Dev. 31.7		% Ave. Dev. 58.3		% Ave. Dev. 38.0	
8.	39.9 Ave. Mgs.		2.4 Ave. Mgs.		9.4 Ave. Mgs.	
9.	47.5 Ave. Mgs.		6.0 Ave. Mgs.		9.6 Ave. Mgs.	
10	14.0 Ave. Mgs.		4.0 Ave. Mgs.		35.0 Ave. Mgs.	
11.	116.2 Ave. Mgs.		0.8 Ave. Mgs.		5.9 Ave. Mgs.	

(12 cooperators)

FABRIC LOSS METHOD—WEBBING CLOTHES MOTH

Cooperator	*Untreated* Mgs. Loss	Deviation	*Treated with Non-Permanent Type Repellent* Mgs. Loss	Deviation	*Treated with Permanent Type Repellent* Mgs. Loss	Deviation
3.	28.4	15.9	4.3	0.6	9.5	1.4
	53.5	9.2	3.7	0.0	7.6	0.5
	46.1	1.8	3.6	0.1	10.0	1.9
	49.2	4.9	3.2	0.5	5.2	2.9
	44.3 Ave.	8.0 Ave.	3.7 Ave.	0.3 Ave.	8.1 Ave.	1.7 Ave.
	% Ave. Dev. 15.8		% Ave. Dev. 8.1		% Ave. Dev. 20.9	

4.	58.8	3.6	18.7	6.8	22.1	3.7
	64.1	8.9	11.3	0.6	21.1	2.7
	59.6	4.4	14.6	2.7	13.9	4.5
	38.1	17.1	2.9	9.0	16.6	1.8
	55.2 Ave.	8.5 Ave.	11.9 Ave.	4.8 Ave.	18.4 Ave.	3.2 Ave.
	% Ave. Dev. 5.7		% Ave. Dev. 40.3		% Ave. Dev. 17.4	
7.	88.0 (1 test only)		+ 7.0 (1 test only)		+ 18.0	8.5
					+ 1.0	8.5
					+ 9.5 Ave.	8.5 Ave.
					% Ave. Dev. 89.5	
	(3 cooperators)					

The following is a typical table showing visual damage to fabric:

BROADCLOTH (STANDARD TEST CLOTH)

EXCREMENT WEIGHT METHOD—BLACK CARPET BEETLE

Cooperator	*Untreated*	*Treated with Non-Permanent Type Repellent*	*Treated with Permanent Type Repellent*
1.	Bad	Slight	Holes *
			Shearing
			Clipping
2.	Considerable	None	None
3.	Bad	Slight Clipping	Holes *
			Shearing
			Clipping
4.	Very Bad	Nap Clipped	Nap Destroyed
5.	Appreciable	Slight Nap Damage	Slight Nap Damage
6.	Very Bad	Nap Clipped	Very Slight Nap Damage
7.	Appreciable	Nap Damage	Slight Nap Damage
8.	Appreciable	Nap Shearing	Nap Shearing
9.	Bad	Nap Shearing	Nap Shearing
10.	Bad	Nap Feeding	Slight
11.	Severe	None	Slight

FABRIC LOSS METHOD—BLACK CARPET BEETLE

Cooperator	*Untreated*	*Treated with Non-Permanent Type Repellent*	*Treated with Permanent Type Repellent*
1.	Bad	Nap Clipped	Holes *
			Shearing
			Clipping
2.	Considerable	None	None
3.	Bad	Slight Clipping	Holes *
			Shearing
			Clipping
4.	Very Bad	Nap Clipped	Nap Destroyed
5.	Appreciable	Slight Nap Damage	Slight Nap Damage
6.	Very Bad	Nap Clipped	Very Slight Nap Damage
7.	Appreciable	Nap Damage	Slight Nap Damage
8.	Appreciable	Nap Shearing	Nap Shearing
9.	Bad	Nap Shearing	Nap Shearing
10.	Bad	Nap Feeding	Slight
11.	Severe	None	Slight

FABRIC LOSS METHOD—WEBBING CLOTHES MOTH

Cooperator	*Untreated*	*Treated with Non-Permanent Type Repellent*	*Treated with Permanent Type Repellent*
3.	Bad	Slight Clipping	Slight Clipping
4.	Bad	Clipping	Nap Destroyed
5.	Severe	Nap Damage	Slight Nap Damage

* Apparently out of line inasmuch as the milligrams Excrement Weight and Milligrams Fabric Loss are low, showing only slight eating.

above; or in other words, nine types of material, each type being untreated, non-permanent treated (this with the exception of the rug) and permanent treated, and each of these done by both the Excrement Weight Method and the Fabric Loss Method. This totals 52 tests, and inasmuch as each cooperator ran each test in quadruplicate they turned into headquarters a total of 208 individual tests. There being twelve cooperators, it can thus be seen that except for the few gaps, the summary chart is the result of 2496 tests.

It was furthermore thought that at a later date it might be advisable to set up two types of test cloth; that is, one in addition to the present type—the new one to be an average-weight blanket material Mr. Dorn was charged with looking into this and reporting back to the committees at a later date.

Report was made by two of the cooperators present that they had, during the past few years, run a life-cycle cabinet, but had found after repeated checking that the tests set up in "Test of Evaluation of Compounds Designed to Increase the Resistance of Fabrics and Yarns to Insect Pests" so nearly paralleled performance tests as shown by the life-cycle cabinet that they had discarded the use of the life-cycle cabinet.

The various committees will meet again as soon as it seems advisable to the three chairmen, or whenever sufficient data is produced by any of the members to warrant calling such a meeting.

The chairmen of the three committees would like to, at this time, take the opportunity of thanking the various cooperators for their splendid attitude and the fine work done during the testing.

A resume of the tests is given in the accompanying tables.

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Discussion Session of the Inter-Society Color Council, March 1, 1944, on SMALL COLOR DIFFERENCES

This meeting co-sponsored by the American Association of Textile Chemists and Colorists and the Federation of Paint and Varnish Production Clubs

(Continued from June 5, 1944, issue)

Chairman Judd: Dr. Draves, do you have something further from the American Association of Textile Chemists & Colorists?

Dr. Draves: Mr. Simon has a brief paper on the general use of the General Electric Recording Spectrophotometer at the Shelton plant of Sidney Blumenthal & Company.

USE OF THE RECORDING SPECTROPHOTOMETER

F. T. SIMON

Sidney Blumenthal & Co.

WHEN I tell of the use of the spectrophotometer at the Shelton Looms plant of Sidney Blumenthal & Company, I speak only of past accomplishments for none of which I can claim credit. As you probably know, we are large manufacturers of pile fabrics like automobile, railroad, and furniture upholstery. It was primarily the aforementioned automobile upholstery trade—of the pre-war days—which prompted the company to embark on its career with the spectrophotometer.

The magnitude of the mass-production methods used in the automobile manufacturing industry is well known to all of you, but consider for a moment that these methods only developed after the advent of closely controlled production means which made every single part interchangeable with any other similar one. Naturally, the upholstery in the car could not be excepted from this broad scheme of things. We had to adopt, because of customer demands of close duplication, strict colorimetric control of our dyeing process. This first meant an accurate check of shipments of dye used and the spectrophotometer offered the most expeditious means of doing it. The next step was to work at the most likely source of variation—the dye application itself. It was here that the spectrophotometer proved indispensable by producing a permanent record of the color of the dyebath which enabled the dyer to duplicate one dyebath after another without the fear of the common attendant errors of inaccurate weighing of dyestuffs, improper volume of makeup, or the question of evaporation losses. It was through these means that we developed a degree of uniformity which we were justly proud of, and, incidentally, satisfied the customer.

But the control of the automobile upholstery did not end at just its color: it had to be exceptionally fast to light as well. Colorimetric means enabled the management to correctly evaluate whether they were using the fastest dyes available or should they switch to some newer, faster combination.

The question of the fastness to water of cloaking pile fabrics has long been an important one. We use spectrophotometric means to judge the success of the application of water resisting finishes in various fabrics.

To bring things up to date a little, I might mention that we had a contract with the Quartermaster Corps for the production of O. D. serge. We were able to predict by colorimetric means the correct proportion of colored and white stock to mix together to produce a close match for the standard.

A colorimetric method of determining the extent of wool damage by the cystine content—a modified Folin-Marenzi procedure—is one of the chemical determinations done on the spectrophotometer. We also do the copper-carbamate determinations colorimetrically.

The spectrophotometer record, of course, is permanent and prevents dispute about our cloth standards and aids in determining whether a dyed sample is or will be a colorimetric match.

I would like to mention that in both the Shelton and Rocky Mount, North Carolina, plants abridged spectrophotometers are used right in the plant in control work, while the G. E. instrument is the basic instrument maintained in the Research Laboratory at Shelton. It is not merely a powerful research tool but rather an integral part of production in a textile mill which must take colorimetric control very seriously.

* * *

Chairman Judd: Thank you, Mr. Simon.

Does that conclude the AATCC part of the discussion?

Miss Nickerson: Somebody from the AATC & C, either Dr. Draves or Mr. Appel, was going to tell us about their fastness standards. That is one of the things the Society has done that should be brought to the attention of this meeting.

Wm. D. Appel (National Bureau of Standards; presiden., AATC & C): These fastness standards are dyed cloth, for comparison with dyeings of unknown fastness. For a good many years we have had a series of eight dyeings representing eight different degrees of fastness, each dyeing being twice as fast as the preceding member of the series and half as fast as the succeeding one. After a good deal of manipulation, correspondence, testing, and so on, a series was worked out which was in substantial agreement with a similar series adopted in England and in Germany. In the past year we have developed another series of dyeings. Instead of using eight different dyes to eight degrees of fastness we now use two dyes, one relatively permanent, the other relatively fugitive. By dyeing those two dyes on wool stock, then mixing the raw wool in different proportions, and making the mixtures into yarn and then into cloth, we get a series of blue dyeings which are close in color but which vary in fastness in the ways that we want them to, and which are easily enough adjusted so that we can correct errors in spacing and thus have good control of the series of standards. These dyeings are now being prepared in large lots so that they will be available to everyone for use.

Chairman Judd: Thank you, Mr. Appel.

Now we will have the discussion of how small color difference problems are met in the American Ceramic Society. The discussion will be in charge of Dr. I. A. Balinkin of the University of Cincinnati who is Chairman of the American Ceramic delegation to the Inter-Society Color Council. He will be assisted by R. S. Hunter of the National Bureau of Standards, Campbell Robertson of Du Pont, N. J. Kreidl of Bausch & Lomb, and there are some written communications also. Dr. Balinkin.

SMALL COLOR DIFFERENCES IN THE CERAMIC INDUSTRY

DR. I. A. BALINKIN

for the American Ceramic Society

IT should be evident to all of us that every industry, where color is an important attribute of manufactured articles, has its own special problems concerning small color differences. In the ceramic industry the color of the ware as it comes out of the kiln is final. It cannot be corrected by additions to the glaze-batch because it usually takes two or three days from the time the glaze is applied and its color becomes known after firing. It is, therefore, of great importance in the manufacture of ceramic goods to determine the factors that control the color variation and to maintain those factors within necessary limits to produce acceptable color.

The divisions of ceramic industries concerned with color problems are many: Art, White Wares, Enamel, Glass, Materials, and even Refractories and Abrasives. The surface color of a refractory body has a definite influence on the rate of heating and cooling. The color of a grinding wheel may have little to do with its performance, yet trouble is in store for a manufacturer who permits color to vary within too large a range.

Whatever I may say on the subject of "How Small Color Difference Problems Are Met in Ceramic Industry" will deal with the wall tile and it comes as a result of my association with the Cambridge Tile Manufacturing Company of Cincinnati, Ohio. To begin with, however, let me say that I have requested different delegates of the American Ceramic Society to express their views on the same subject. I am happy to say that Mr. Hunter, Dr. Robertson and Dr. Kreidle will follow me with their discussions applicable to Enamel, Chemical Industry, and Glass. I have also two written communications one of which I am going to read in full. It is a report submitted by Professor Watts, Head of the Department of Ceramic Engineering, The Ohio State University, Columbus, Ohio.

"(1) In the whiteware and white wall tile industries a series of standard plates or tiles, similar to those being tested, are used. These standards are made of the purest raw materials used for that ware. Agreed tolerances of both yellow and gray discoloration are established and between these the ware is classed as acceptable white. Extreme yellow and gray discoloration are also generally established beyond which the ware is not classed as commercial white. Usually each plant has three recognized grades of white, known as select white, blue white, and cream white, or by equivalent names, but the tolerances are not standard and more color variation is permitted in some plants than in others.

"(2) In the vitreous enameled steel industry the Hunter Reflectometer is sometimes used. This contains a series of colored filters by which colored light is projected on a plane in which the ware being tested also appears. By adjustment of the filters the amount of discoloration in the ware is duplicated and the degree of deviation from pure white is determined.

"(3) In the Parian china industry, which includes dental porcelains, one method is the use of standard primary red, blue and yellow with white and black segments which can be varied in proportions on the face of a disc. In the center of the wheel a small disc of the colored ware is attached. When the disc is rapidly rotated the colors blend and by adjustment of the ratios of exposure of the various colors the shade of the trial can be evaluated by its components.

"Various other types of colorimeters have been also used but none has been universally accepted. No colorimeter based on measured length of light waves has been developed which is adapted to commercial grading of ware, and although human eyes are variable the trained shader will grade more per hour in a satisfactory manner than by any other method, and at less cost."

This gives you in a few words the picture as it exists in a large variety of ceramic plants.

Another report is from Dr. Schramm of the Onondaga Pottery Company. "In decorating china," Dr. Schramm says, "it is difficult to consider color in the abstract since the proper use of color is so intimately connected with design and with the technique employed in application." "Small color differences, however, form the basis of many decorative effects," concludes the report.

For my own part I am glad to follow Miss Nickerson on this program because I am going to start practically where she left off. As it follows from her able presentation, there are several general formulas for specifying color differences, and the results correlate fairly well with the

average visual estimations. We can therefore assume that the numerical evalution of color differences is sufficiently valid to give us a correct indication of what a consumer sees and what he will accept or reject. Because of the ease with which colors can be measured on Hunter Multipurpose Reflectometer, this colorimeter was employed in our color work. Judd's equation was used to calculate color differences, and we used the name "judd" to designate the unit of color difference computed from Judd's equation.

Our first problem was to determine the reaction of a representative group of forty-six observers in regard to color differences. For that purpose we have assembled five, what might be called "color tolerance boards." These tolerance boards contain nine tiles carefully measured, selected and arranged in such a way that the maximum color difference is equal to one, two, three, four and five judds. The observers were asked the following two questions: (1) Which board in your opinion represents the *most desirable* color variation? (2) Which board in your opinion represents the *maximum possible* color variation which would be acceptable to you as a consumer? There were three different colors, pink, light green and tan, or fifteen of these tolerance boards in all.

When the results of this "Color Variation Ballot" were analyzed it was found out that the most desirable color difference was not necessarily the smallest color difference. The actual values run as follows: 1.3 judds for pink, 2.2 for light green and 1.9 for tan. For maximum acceptable color differences the values came out 2.4, 2.8 and 2.8. It was interesting to note that the numerical values for the color differences of the three colors used were very close, which was a confirmation that Judd's formula is applicable in different domains in the color space. It was valuable to find out the numerical values for the most desirable and the maximum acceptable color tolerances. Notice that the color difference range is only about one judd. Based upon these results of the consumers maximum acceptable color difference a value of three judds can be taken as a definite guide in establishing color tolerances for the ceramic wall tiles.

The next question I wish to discuss with you is that of establishing a standard for a "shade." I had better explain first what we mean by a "shade." For those of you who are thinking in terms of color space, shade may be defined as a part of a color solid bounded by a closed surface so that the maximum separation of any two points on such surface does not exceed three judds. This means that all colors which lie within the boundary of such space will be accepted as one shade with the extreme limits of color differences not over three judds. In a few instances all the tile fall within a single shade. This makes the superintendent of the ceramic plant very happy and the control engineer very proud, and justly so since there is no shading problem. Unfortunately, that is the exception rather than the rule.

Let us follow the life history of a certain glaze which at the time of its chemo-ceramic birth was given just a number, say 700. As the tile coated with this glaze pass through the shading department it was found that the maximum color difference was equal to nine judds. This necessitates the establishment of at least three shades. They are designated as 700-A, 700-B and 700-C. When the next batch of glaze is prepared and fired, it is found that further diversification of color calls for an enlargement of the "family-tree" to include also shades 700-D and 700-E. It is not uncommon to find as many as twelve different shades which gradually come into existence from the same "root" of a ceramic glaze formula. If additional tile is required for a previously made shipment, the specification includes the glaze number as well as its shade. Considerable simplification and reduction in the number of shades can be achieved by following a procedure which I wish to outline.

About two hundred tile were collected from different production runs picked at random from different positions in the kiln. Each tile was measured on the Hunter reflectometer and the values for α and β computed from the reflectance readings for blue, amber and green filters. As you know, these two parameters determine the position of a color on a chromaticity plane. Such a chromaticity plane was established on top of a cardboard box and each tile, properly marked with consecutive numbers from one to two hundred, was located in the coordinate plane of α and β. Then thin steel rods were inserted perpendicularly to this plane, so adjusted that the height of each pin correlated with the reflectance of that color in such a way that the geometrical relationship of equal distances between the terminal points of any two pins gave equal visual perception of their color differences. What we had was an actual mechanical model, somebody called it a porcupine, for color distribution of several production runs for one particular glaze. In a color space so constructed we can use a simple meter stick properly graduated in which the distances are linearly related to color differences expressed in judds.

In this color space, shade is represented by a sphere three judds in diameter. Next is the problem of allocations of different shades. It is done by simply looking at the model and picking out different portions of it of approximately the same spherical volume. Geometrically speaking the centers of such spheres gave us the desired shade standards.

In general it is found that the points representing the colors do not give random distribution. On the contrary, for many glazes the points show maximum concentration in one or another domain of the color space. In such cases we try to pick the center of a densely populated space as our shade standard and around that point draw a sphere one and a half judds in radius.

Such a procedure works out to be very satisfactory. We were able to standardize our shades within the desired

range of color tolerances and it led to a substantial reduction in the number of necessary shades. The process, however, is rather lengthy as you can easily imagine. For two hundred tile the measurements can be made in about two days, it will take another two days to erect the model and still another day to pick out the tiles. If you want to go through this process for twenty or thirty glazes you can see how it will keep one man busy for several months.

It goes without saying that it would be far more desirable to reduce the possibility of color variation in the process of manufacturing wall tile. And here is where the greatest benefit can be derived from modern methods of color measurement and evalution of color difference.

In the manufacture of ceramic glazed products there are two factors which, in addition to possible variation in the raw materials, are of greatest importance in affecting the color uniformity. These factors are the thickness of glaze application, *a*, and the temperature at which the glaze is fired, *t*. If we designate by ΔE a color difference between a standard and a sample tile because of the difference in thickness of the two glazes and temperatures at which they were fired, then we can write this very important relationship—which I prefer to call "color uniformity control equation."

$$\Delta E = \Delta a \left(\frac{\delta E}{\delta a}\right)_t + \Delta t \left(\frac{\delta E}{\delta a}\right)_a$$

Now, the factor $\delta E/\delta a$ represents the intrinsic property of the glaze to change its color depending upon the thickness at which the glaze is being applied. If we prepare a series of samples sprayed so that the glaze thickness varies in steps of one-thousandth of an inch (one mil) we will find that at first there will be a large stepping in color which will gradually taper off. The thicker the glaze, the less perceptible will become the color difference for a thickness variation of one mil. The thickness of a common variety of ceramic glaze after firing is in the neighborhood of ten mils. For this value we can determine experimentally how many judds in color difference would result from a thickness difference of one mil. Usually glazes vary greatly in this respect depending upon the nature of the materials, especially their opacifying properties. Some glazes may have the values less than .5 judds per mil, others ten times as much. The factor Δa in the first term of this equation represents the range of production variations in thickness of glaze applications. It may well be up to one or two mils. Let us take a specific case of a glaze with $\delta E/\delta a$ equal to .84 judds per mil and a spraying machine variation of 1.3 mils. The final effect on the color of the glaze is evidently equal to $1.3 \times .84 = 1.1$ judds.

It is obvious that in order to obtain a desired result of eliminating color variation due to variation in thickness of glaze either Δa, $\delta E/\delta a$ or both should be equal to zero. This, of course, is impossible to realize under actual manufacturing conditions. It is possible, however, to know what each one of these factors is, and with that knowledge proper steps can be taken to keep them within required limits.

Previous discussion dealt only with the first term of the color uniformity control equation—a term which accounts for color change as a result of change of thickness of glaze under the condition of constant kiln temperature. Exactly the same consideration can now be applied to the second factor, that is variation in temperature. Here again we deal with the intrinsic property of the glaze itself to change in color because of temperature conditions: $\delta E/\delta t$ and Δt the difference in temperature to which the glaze is subjected in the kiln. Here again we deal with the actual plant conditions under which Δt represents the temperature difference in the kiln and $\delta E/\delta t$ the intrinsic property of the glaze itself, *i.e.*, the rate of its color change with changing temperature expressed in judds per cone.

One more term may be added to the equation to take care of the effect of oxygen content in the kiln atmosphere. Some work along these lines is now in progress at Rutgers University.

With this method of color uniformity control it becomes possible to reduce the number of shades for all glaze colors to not more than three. Very rarely do we get into a trouble of getting a shade outside of our standard range, unless the raw materials are off—but that is another story.

The object of controlling color uniformity is to simplify, by decreasing the number of standard shades, in order to carry a smaller stock; to conserve by reducing the time of shading or grading; to certify quality by giving numerical color tolerances. There is another phase of color standardization, and that is to educate. The consumer should learn that he is frequently paying an unreasonable price for color uniformity in products where color is no indication of quality.

We are told that the sword maker in the days of antiquity would hold the heated blade against the setting sun and when the two colors matched he quenched the blade. I am sure that in those days there was no difficulty in accepting colors of ceramic tile as they came out of the kiln. But today as we become more conscious of colors and color differences, exact manufacturing control in our mass production becomes a necessity. And here is where we can make practical applications and derive great benefit from the work of Dr. Judd, Miss Nickerson, Dr. Adams and many others.

As for the instruments for measuring and computing color differences we would like to have something similar to an adding machine where one could strike three numbers for one color, three numbers for another color and then look up to see the numerical value of color difference. With the rapid rate at which modern electronic computing machines are being introduced, we may not be as far as we think from such realization. I trust that is in store for us in the near future. (Applause)

* * *

Chairman Judd: Thank you, Dr. Balinkin.

Do you wish to call on Mr. Hunter and Dr. Robertson?

Dr. Balinkin: Mr. Hunter, may I ask you to make a contribution?

Mr. Hunter: I plan to confine my remarks on color tolerance practice to the one field that I know a little about, that is the porcelain-enamel field. I also plan to speak of color tolerance practice in the average or usual case.

Almost all color grading in this field is done visually, and practically all decisions regarding the acceptability of any given product are based on two factors: (1) the desire of the seller to satisfy the purchaser at the given time, and (2) the desire of the purchaser to obtain speedy delivery of his goods at the price agreed on.

I thought I might describe briefly a typical case involving color tolerances in the porcelain-enamel industry to suggest some of the factors involved.

Let us assume first that it is peace time (for the porcelain-enamel industry has just about been put out of business by the war) and Mr. Sello, the Vice-President in charge of Sales of the Podunk Enamel and Stamping Company has just obtained an order from F. W. Woolworth & Company for two million red drinking cups. And Mr. Sello has obtained from the purchasing agent of Woolworth a half of a plastic drinking cup that has been sawed down the middle, one-half to be kept in the Woolworth office and the other half to be taken by Mr. Sello. Mr. Sello doesn't go immediately to his company. He heads first for the Ceramic Chemical Color Company who supply Mr. Sello's company with the enamel frits, which are glasses in ground form that are applied to the steel stampings to make the finished drinking cups. Mr. Sello takes this half of the plastic drinking cup to Mr. Mako the chief of the laboratory there. And in about a day Mr. Mako is able to give him a round disk of metal with porcelain enamel on it. It is a pretty good color match for the red cup.

To make this disk, Mr. Mako first probably looked at a large wall display in which there were many chips of red, yellow, orange, green, and all the different porcelain-enamel colors. He made comparisons on this wall until he found a chip that was close in color to the red cup. Then he looked up the laboratory record to see what he did to obtain the color of this chip. With this record of his previous experience to start from, it was only necessary to make a couple of trial grinds and probably four or five shots in a lab furnace to get a pretty good match.

So the Ceramic Color Company starts grinding up the frits for these two million drinking cups. They make additional test disks in their own lab furnace to insure that such factors as change in raw material or change from a small to a large grinding mill haven't changed their color. And so pretty soon they ship to the Podunk Company this ground glass ready to fire on the steel forms to make the red drinking cups.

Podunk meanwhile has been stamping steel cup forms just as fast as possible. The instant the frit arrives they mix some up, spray it onto a number of cup forms and send it to their continuous furnace in the actual production cycle that will be used for making the cups. And the first cups that come out and cool are immediately examined, probably by a number of very interested men. Mr. Sello asks the first question: Do they match the standard? Well, the chances are they won't for there are three sources of discrepancy which must be contended with.

One is the heating cycle difference between the continuous production furnace that Podunk uses and the lab furnace that was originally used to fire the frit. The second source of discrepancy is one that Mr. Mako did his best to overcome—the lack of ceramic colorants to duplicate exactly the plastic colorants. Source of discrepancy number three is one that is not widely appreciated, but it can be quite troublesome—the different geometric-optical characteristics of the porcelain-enamel and plastic. The plastic, of course, is translucent and if illumination reaches the underside of the plastic half of a cup as the comparisons are being made, some of this "underside illumination" will be involved in the comparisons. What one sees when he compares the plastic and enameled-steel specimens thus changes with any change of this "underside illumination." I believe that in general the porcelain- enamel industry does not realize the necessity for standard geometric conditions of illumination and viewing in making comparisons for color. Even in the use of instruments for the study of color, we have yet to standardize on illuminating and viewing geometric conditions.

In the manufacture of our red cups there will probably next be a number of air mail shipments of sample drinking cups both to the Woolworth Company to see if they can't be persuaded to accept the product in its present color, and to Mr. Mako to see what can be done to correct the color. Mr. Mako is very likely to receive a telegram asking him to come immediately to Podunk to see if he can't get the color on these cups right. So as I said in the beginning, the factor which eventually determine the size of the color discrepancy which is accepted are the desire of the seller to satisfy the buyer and the desire of the buyer to get his supplies in a hurry at the quoted price.

I don't think instruments are very much used in the present practice of color matchings even though we in laboratories are continually working on methods for their use. In special cases such as that Dr. Balinkin just spoke of they are actually using instruments.

There are, of course, problems in color tolerance that remain after production of the cups is under way. There will be differences in temperature from the center to the side of the continuous furnace and these differences are going to cause slight differences in the colors of the finished product. The officials at Podunk are going to have to decide on the yellowest cup and the reddest cup that they will accept from the furnace and then persuade Woolworth

to concur in their judgment.

In the production of white ceramic materials the problem of controlling color is a little simpler and I believe they are able to use instruments. Porcelain enamel owes its existence, as you may know, to the fact that glasses containing certain oxides of cobalt can be made to adhere very well to sheet steel. Cobalt oxides are in general blue and so you usually start, in the production of a white porcelain enameled product, with a very dark blue ground coat of enamel on steel. To color the finished product white, the opaque white frits are purposely yellowed to overcome the blueness of the cobalt oxide. As more of the white frit is applied to a surface, it becomes higher in reflectance and the bluish color changes to yellow. In general the producers of white ware are using the reflectometer as a means for determining that they are getting the same amount of this creamy white frit on each surface coated. Actually it isn't the reflectance that they are controlling; they are controlling the color which changes with increasing frit from a darkish blue-white up to a creamy high reflectance yellow-white. In practice it is possible to control this by means of the reflectometer using only one filter.

Of course, control of color in the white products is extremely important because the adjacent parts of a kitchen range or refrigerator have to match in color quite closely if the differences between them are not to be seen.

Chairman Judd: Thank you, Mr. Hunter.

Do you wish, Dr. Balinkin, to call on Dr. Robertson?

Dr. Balinkin: Yes.

Dr. Robertson: I have a few brief remarks on the matter of color differences in the ceramic industry from a commercial viewpoint, under three headings:

The first is, according to the title of this discussion, how different problems are met today. That has already been touched on by Dr. Balinkin and Mr. Hunter. I think today 95 per cent of the ceramic industry still uses the crudest sort of visual comparisons. Dr. Balinkin's remarkable pioneering work at the Cambridge Tile Company is quite exceptional. I think the average user would still consider that much too formidable a method without having someone as expert as Dr. Balinkin to work on it with him.

In white, as Mr. Hunter said, a number of instruments are used in production control successfully. They are measuring one dimension. The major central problem, of course, is measuring the color difference and specifying tolerance when all dimensions are involved. I think in the ceramic industry there is a real desire for that. The symposium on color which was sponsored by the Council at a recent meeting two years ago was attended with the greatest of interest, and I interpret that to mean that there is an eager demand for a method of measuring color differences which is practical from their viewpoint, which means that it mustn't be too mathematical; it should be, as Dr. Balinkin said, a matter of punching keys. It is important particularly in ceramics because when the ware comes out of the furnace, which is usually a big, continuous furnace, in general it is finished; you can't do much about it. It either is good or it might be scrapped or have to be sold at a great discount. Large sums of money are at stake oftentimes for that reason. And I think that as this work progresses further as it has since my acquaintance with the Council, in an ever steady progression toward quantitative, useful methods of measuring differences, it will be eagerly welcomed by the ceramic industry.

I also want to mention here just this point that occurs to me in this discussion. I don't think it has been quite clearly enough brought out that two things have been talked about. One is the matter of perceptibility, and the other is the matter of acceptability. If we have a standard, there is the small color solid representing the perceptibility, which is what is being worked on by these various formulas, and acceptability which is in general quite a bit bigger.

In general in the ceramic industry where the control has been difficult, the tolerance standards while crude are rather wide also, sometimes detrimentally so. It appears to me that some of this work such as the Porcelain Enamel Institute did actually brought out that there is an unconscious tolerance given by the observer over and above perceptibility. He allows something over and above what he can definitely see.

And my last point, particularly in connection with instrumental measurement of differences in ceramics, is an important one from a practical viewpoint; that is that while textiles and painted surfaces can most of the time be brought into plane form, a flat plane which is a reproducible, most finished ceramic surfaces where you have to measure color are not plane; they are all sorts of shapes, compound curves and everything else. The plane surface as on a good quality wall tile is the exception rather than the rule. That introduces extraordinary difficulty in connection with the use of instruments, but I still don't feel it is insuperable. It would appear to me that the work on quantitative instrumental specification of color should tend to the use of smaller areas of observation. The label on a returnable bottle may contain three colors and the areas for each may be quite small. If you have to have several square inches you can't do very much on the actual ware itself. And that is a difficulty which doesn't exist in the textile field. You have plenty of material there usually to observe and it is no problem. You can't do that in ceramics. So I think probably we have one of the toughest of all problems in this line but nevertheless I think it is a most important one and all progress will be very fruitful.

Chairman Judd: Thank you, Mr. Robertson.

Do you have something more, Dr. Balinkin?

Dr. Balinkin: Yes, I would like to have Dr. Kreidl's contribution.

Chairman Judd: Dr. Kreidl, of the Bausch & Lomb Optical Company.

Dr. Kreidl: In answering Dr. Balinkin's question as to how tolerances are met in the manufacture of colored glasses, we restricted ourselves to the reaction of the glass

chemist. The manufacturers of colored glass are quite well represented in this organization by the Optical Society of America also, and I believe that in the future we shall probably have opportunity to hear the reactions of these men in our industry.

As far as the attitude of the glass chemist is concerned, we find the following practices prevalent in measuring color tolerances in tinted eye glasses and colored filters.

First, matching between two standards either by a colorimeter or by simple visual comparison. In this matching between two standards, I find that judgment of intensity rather than of hue is used by the observer. This judgment of intensity, however, frequently suffices, since many chemical deviations cause symbatic changes of intensity and hue. In some cases where the color is sensitive to thermal history or to reduction and oxidation, we notice that the operators usually eliminate such deviations in hue before the routine test is applied.

The second general method, used in more delicate cases and in filter work, is the measurement of the transmission at one critical wave length by a spectrophotometer. In this case zero transmission at this wave length is specified and the usual tolerance is one-half per cent. In a third method the tolerance is given by what you may call tangential lines to a specified transmission curve. (Illustrating on the blackboard.) In this case the chemist complains that only a small portion of the colors represented by this tolerated area is chemically attainable. Therefore you are usually forced toward the upper limit of the tolerated area at the side of the specified zero transmission. It may be that an attainable curve a little beyond the other side of the tolerated area would represent a better color match and show a better performance.

Finally, there are very few data on the chromaticity differences of acceptable tinted lenses. I could not find enough data to state how many Judds, or steps in any of the formulas represented in the foregoing papers, the customer accepts. I have prepared two green colors representing the maximum difference now accepted by people wearing tinted lenses and whoever is interested may inspect them and get a judgment of the color difference.

(Applause.)

Chairman Judd: These four speakers have given us a very comprehensive idea of small color difference problems in the ceramic industry.

Now we shall hear from the Federation of Paint and Varnish Production Clubs, from Francis Scofield who is the chairman of the delegation to the Inter-Society Color Council.

Mr. Scofield: I hardly need to spend very much time on this. The work that I described to you earlier is practically all of the color tolerance work which I know of which has been conducted on an instrumental basis in the paint industry.

Mr. Hunter's description of the small porcelain enamel plant had a very familiar ring to me.

I regret to say that in large measure the acceptability of a color match in the paint industry seems to be decided by what we might call public clamor rather than by unbiased judgment. There is a wide demand for such methods and to meet with fairly widespread acceptance they wouldn't have to be very good but they would have to be easy. As far as I can make out all the paint industry wants is a machine in which you put the sample on one side and the standard on the other and you push a button and if it is satisfactory a white light shows and if it isn't a red light shows. (Laughter.) It doesn't need to be complex or anything, just a simple machine like that! But as a matter of fact, for some period of time a formula to be satisfactory is going to have to sacrifice precision in the interests of simplicity. And when you consider the degree of precision and reproducibility attainable in many of the other test methods with which the paint and varnish industry has dealings, why you would be very happy with a correlation of .20. Some others we have I think belong in the class of Dr. Judd's No. 8! Correlation seems to be about of that order!

Mr. G. G. Sward has recently collected all of the paragraphs out of paint specifications dealing with accelerated weathering and similar color retention, gloss retention, and chalking tests, and there is a regrettable recurrence of phrases such as "shall show little or no change in color," "some change in lightness but no change in hue or chroma is permitted," and similar remarks, which means of course that every time a sample is compared before and after fading that a public debating society is instituted and the gentleman who can shout the loudest usually wins the decision. So that every time a man has a paint sample which is turned down because it either does not meet the original color or fades too much and he loses the argument, you have another potential convert for an instrumental measurement. But I am afraid they are going to have to be simpler than the ones we have now. (Applause.)

(To be continued)

APPLICATION BLANKS FOR INDIVIDUAL AND CORPORATE MEMBERSHIPS ARE AVAILABLE FROM THE SECRETARY

Dr. H. C. Chapin

Lowell Textile Institute
Lowell, Massachusetts

MEETING, SOUTHEASTERN SECTION

THE April meeting of the Southeastern Section was held in Atlanta, Georgia, at the Atlanta Athletic Club on Saturday evening, April 22, 1944, beginning at 7:00 p.m.

Earl Mauldin of *Textile World* led the singing of the first verse of "America" and also returned thanks. Dinner was served at 7:30 p.m.

Chairman O. G. Edwards called for reports from our various committee chairmen and then announced that our next meeting will be held in LaGrange, Georgia, at the Callaway Auditorium on Saturday, September 9th, 1944.

The meeting was then turned over to L. E. Whittelsey, our program chairman, who called upon Norman P. Arnold to introduce our first speaker, Donald J. Campbell, Mgr. Peroxygen Research and Service, Electro Chemicals Dept. E. I. Du Pont de Nemours & Co., Inc., who spoke on, "Continuous Peroxide Bleaching." Mr. Campbell showed slides of photographs of actual installations of this process. Many questions were asked Mr. Campbell and much interest shown in his subject.

L. L. Bamberger of Lanett Bleachery and Dye Works was called upon to introduce our next speaker, C. A. French of Industrial Heat Engineering Co., who discussed, "High Temperature Drying with Infra Red Radiant Energy." Mr. French requested questions on this subject from the floor, and many questions were asked which were answered by the speaker.

Our two attendance prizes were won by G. E. Frick, of Lowell Bleachery South and Nesbitt Johnson of Geigy Co., Inc.

Total attendance, 97 members and guests.

Respectfully submitted,
W. B. GRIFFIN,
Secretary.

SPRING MEETING, MID-WEST SECTION

THE spring meeting of the Mid-West Section was held at the Schroeder Hotel, Milwaukee, Wisc., May 6, 1944. The afternoon meeting was held at 3:00 p.m. Ninety members and guests attended.

During our information forum, with A. G. Alexander of the Phoenix Hosiery Co., Charles E. Maher of the Maher Color & Chemical Co., Louis Blank of the Morgan Dyeing & Bleaching Co. and John Moertel of the E. I. du Pont de Nemours & Co., acting as experts, the following questions were discussed:

1. Can silk, which has been yellowed by contact with chlorine, be whitened again?
2. Do you think the unshaded concentrated type of dyes would be preferred in the average dyehouse?
3. Should dyestuff manufacturers furnish more information on dyeing properties of their products?
4. What methods or materials can be used to prevent or remove loose particles of color when dyeing vats or naphthols in package or raw stock machines?
5. Will synthetic replace the natural fibers? If not, why?
6. Can rayon be bleached without lowering tensile strength in Monel or copper machines with sodium hypochlorite? How?
7. In the history of dermatitis caused by textiles, some chemicals used as finishes or dyes have proven to be toxic, while others have reacted only to persons having an idiosyncrasy to that particular dye or chemical. In patch testing individuals for sensitivity, what should be the dividing line between toxicity and allergic reaction?
8. In dyeing a bright shade of blue or scarlet on a half hose constructed of wool over mercerized 50-50, we have difficulty with the wool colors breaking down and becoming very flat and dull in shade. The pH of dye bath is 7.4. The dyeing temperature is 200° F.
   a. What can be done to prevent this from occurring?
   b. How can the lot be brought back to shade when it does occur?
9. 16 oz. Grey Melton—In connection with the dyeing of this particular fabric, there has been some difficulty and in discussing same with our dyer, he suggested that sample be sent for discussion. You will notice on close examination that the specks or nibs give it a mixey appearance. What we would like to know is how we can cover these specks or nibs to give it a more solid shade.

   This difficulty is not experienced when this cloth is dyed navy blue.

This was followed by a talk on "New Soaps of Domestic Origin" by Charles Lennox of Swift & Co. The members and guests present found this subject very interesting. The meeting adjourned at 5:00 p.m.

Dinner was served at 8:00 p.m. and attended by eighty-nine members and guests. The reading of the minutes and the treasurer's report was dispensed with. Elmer Smith gave a report of the Outing Committee. The Outing is to be held at Lake Lawn, Delavan, Wisc., June 24th.

J. P. Ditchman of the engineering department of General Electric Co., Nela Park, Cleveland, Ohio, was introduced and he spoke on "Electric Lamp Infra Red Radiation," adapted to drying operations in the Textile Industry. Mr. Ditchman said that while infra red drying has been successfully used in printing textiles, no extensive research has been undertaken on the use of this method in the textile finishing trade. He showed slides and described the operation of infra red drying in a number of industries.

Mr. Ditchman did not have a paper prepared for publication, however, he did say a pamphlet was being prepared. It is suggested interested parties write to Mr. Ditchman for the pamphlet mentioned.

The meeting adjourned at 10:30 p.m.

Respectfully submitted,
LOUIS HOEHN, JR.,
Secretary.

MEMBERSHIP APPLICATIONS

Senior

Robert W. Angstadt—Superintendent, Dominion Silk Dye & Finishing Co., Drummondville, Que., Canada. Sponsors: F. H. Riale, J. Niewaroski.

Edward F. Arnold—Chemist, Commercial Solvents Corp., New York, N. Y. Sponsors: T. F. O'Brien, P. J. Kennedy.

George A. Artope—Colorist & Demonstrator, Nat. Aniline Div., Allied Chemical & Dye Corp., Charlotte, N. C. Sponsors: W. L. Barker, J. T. Chase.

Royden N. Aston—Asst. Research Chemist, Mathieson Alkali Works, Niagara Falls, N. Y. Sponsor: L. D. Fleming.

Caral A. Bachmeier—Vice Pres., Bachmeier & Co., New York, N. Y. Sponsors: J. A. Barrington, H. A. Sweet.

George L. Berry—Dyer, Holt Williamson Mfg. Co., Fayetteville, N. C. Sponsors: W. L. Barker, K. Mackenzie.

Edwin M. Boppre—Boss Dyer, Dexter Mills, Elgin, Ill. Sponsors: A. P. Roy, C. M. Robbins.

Russell D. Broadhurst—Textile Chemist and Colorist, The Russell Mfg. Co., Middletown, Conn. Sponsors: E. H. Gamble, G. W. Schmit.

John A. Cairns—Partner, John A. Cairns and Company, New York, N. Y. Sponsors: E. Driscoll, N. A. Johnson.

Mylan Carrigan—Overseer of Dyeing, North Star Woolen Mill Co., Minneapolis, Minn. Sponsors: Samuel Klein, George B. Chabot, Jr.

Elliott D. Cole—Chief Chemist & Asst. Plant Mgr., Anchor Color & Gum Works, Dighton, Mass. Sponsors: I. W. Fallstrom, F. W. Mayer.

William E. Coughlin—Director, Textile Lab. Good Housekeeping Inst., Hearst Magazines, New York, N. Y. Sponsors: E. Driscoll, F. Stutz.

William S. Curley—Asst. Designer, Atlanta Woolen Mills, Atlanta, Ga. Sponsor: W. B. Griffin.

Joseph Diani—Asst. Foreman Dyer, Thomas Taylor & Sons, Inc., Marlboro, Mass. Sponsors: H. C. Selya, T. M. Kelly.

Gedeon Durand—Overseer of Dyeing, Roniteau Mills, Inc., Ashaway, R. I. Sponsors: D. H. Searle, R. F. Culver.

John E. Durrell—Overseer of Dyeing, Georges River Woolen Mills, Warren, Me. Sponsors: H. M. Hartnett, J. T. Allen.

Donald J. Eccleston—Service Mgr., Aridye Corp., Fair Lawn, N. J. Sponsors: H. L. Young, A. F. McLean.

J. Harry Eisenhardt—Supt. Finishing, Nomend Hosiery, Inc., Philadelphia, Pa. Sponsors: J. A. Clark, A. E. Raimo.

Paul M. Elliott—Research Chemist, Naugatuck Chemical Co., Naugatuck, Conn. Sponsors: F. W. Sturtevant, J. Kurlychek.

John S. Fassett—Owner, Fassett Yarn Dye Works, Milwaukee, Wisc. Sponsors: G. E. Osha, A. T. Brainerd.

Edward A. Goetz—Asst. Supt. Dyeing Dept., Mock-Judson-Voehringer Co., Long Island City, N. Y. Sponsors: T. F. O'Brien, L. O. Koons.

Grover C. Gregory—Supt., Hartsville Print & Dye Works, Hartsville, S. C.

William H. Gregory—Dyer, Seymour Woolen Mills, Seymour, Ind. Sponsors: L. Hoehn, Jr., B. H. Sharman.

William C. Hall—Boss Dyer, Rock Hill Printing & Finishing Co., Rock Hill, S. C. Sponsors: L. G. Atkins, T. E. White.

Morris B. Hart—Chemist, Hart Products Corp., New York, N. Y. Sponsor: H. M. Friedman.

G. Thomas Hodges, 3rd—Textile Engr., Foreign Economic Admin., Washington, D. C. Sponsors: O. F. Marks, H. E. Hager.

Charles C. Hollenbach—Salesman and Demonstrator, Althouse Chemical Co., Providence, R. I. Sponsors: C. H. Church, A. N. Graves.

John W. Jordan—Textile Chemist, Alco Oil & Chemical Corp., Philadelphia, Pa. Sponsors: W. Allen, A. E. Jones.

Arthur Kahn—President, Arthur Kahn Co., Inc., New York, N. Y. Sponsors: W. H. Macfarlane, E. Driscoll.

James H. Kettering—Assoc. Chemist, Southern Reg. Research Lab., U. S. Dept. of Agric., New Orleans, La. Sponsors: J. D. Dean, C. F. Goldthwait.

Walter H. Krewson—Supt. of Dyeing, Bossong Hosiery Mills, Inc., Asheboro, N. C. Sponsors: R. H. Smith, R. A. Bruce.

Raymond J. La Belle—Asst. Drug Clerk, Talbot Mills, North Billerica, Mass. Sponsors: G. H. Ennis, C. L. Daly.

Kenneth V. Marshall—Textile Colorist, General Dyestuff Corp., New York, N. Y. Sponsors: C. Z. Draves, R. Bowman.

Eli H. McAngus—Lab. Director, Drayton Mills, Spartanburg, S. C. Sponsors: P. S. Gilchrist, Jr., C. W. Gilchrist.

Alfred J. McGregor—Textile Colorist, John Campbell & Co., Inc., New York, N. Y. Sponsors: A. E. Raimo, A. R. Lundquist.

Malcolm C. Mobley—Dyer, Central Yarn & Dyeing Co., Gastonia, N. C. Sponsors: F. E. Sprock, R. H. Smith.

Daniel K. Ogles—Sales Engr., Stodghill & Co., Atlanta, Ga. Sponsor: O. G. Edwards.

Sam Parry—Overseer, Dyeing & Bleaching, George C. Moore Co., Westerly, R. I. Sponsors: L. Shapiro, H. C. Selya.

Frederick Phil—Asst. Supt., The Russell Mfg. Co., Middletown, Conn. Sponsors: E. H. Gamble, G. W. Schmid.

Charles Piccione—Head Dyer, Allied Textile Printers, Paterson, N. J. Sponsors: C. C. Knights, E. H. Staab.

Harry S. Porter—Chemist, Kali Mfg. Co., Philadelphia, Pa. Sponsors: S. G. Davenport, E. H. Wall.

Robert W. Price—Asst. Dyer, Union Bleachery, Greenville, S. C. Sponsors: C. N. Rabold, E. S. Tillinghast.

Robert T. Pullar—Director of Research, Rosemary Sales, New York, N. Y.

George R. Purdy—Technical Instructor, Onyx Oil & Chemical Co., Jersey City, N. J. Sponsors: T. F. O'Brien, C. D. Ehrengart.

Charles W. Rice—Mgr. Public Relations, American Viscose Corp., New York, N. Y. Sponsors: A. R. Wachter, W. Stump.

Orrie Ruitenberg, Jr.—Boss Finisher, Beaunit Mills, Inc., Cohoes, N. Y. Sponsors: J. Colman, J. A. Waring.

Sam. Scheibner—Boss Dyer, Pohatcong Hosiery Mills, Washington, N. J. Sponsors: W. H. Bertolet, Jr., E. J. Diamond.

Emil W. Seasongood—Tech. Adviser, Laurel Soap Mfg. Co., Inc., Philadelphia, Pa. Sponsors: W. H. Bertolet, Jr., E. J. Diamond.

Frederick B. Smith—Tech. & Stylist, Arthur Kahn Co., Inc., New York, N. Y. Sponsors: W. H. Macfarlane, E. Freedman.

R. B. Taylor—Dyer, Cloverdale Dye Works, Inc., High Point, N C. Sponsors: E. L. Caswell, C. T. Anderson.

Paul C. Thomas—Treas.-Gen. Mgr., Moreland Chemical Co., Spartanburg, S. C. Sponsors: J. W. Ivey, L. G. Atkins.

Samuel J. Van Haste—Chemist, Modern Central Dyeing & Finishing Co., Inc., Paterson, N. J. Sponsors: H. De Groot, A. R. Wachter.

Americo P. Ventrella—Dyeing Supervisor, Brewster Finishing Co., Inc., Paterson, N. J. Sponsors: C. C. Knights, E. H. Staab.

Robert E. Ward—Asst. Chemist, Quartermaster Depot, Jeffersonville, Ind. Sponsors: A. R. Macormac, E. C. Bertolet.

Joe L. Whisnant—Augusta Chemical Co., Augusta, Ga., Sponsors: L. G. Atkins, T. E. White.

David H. Wilcox, Jr.—Vice President, Augusta Chemical Co., Augusta, Ga., Sponsors: W. C. Carn, J. J. Egbert.

Herbert C. Whitehouse—Manager, North Star Woolen Mill Co., Minneapolis, Minn. Sponsors: S. Klein, G. B. Chabot, Jr.

Leroy C. Zumpfe—Chemist, General Dyestuff Corp., New York, N. Y. Sponsors: H. C. Borghetty, H. E. Hager.

Junior

Alfred J. Demers—2nd Lt. U. S. Army, 124 Franklin St., Lawrence, Mass. Sponsors: L. A. Olney, H. C. Chapin.

David I. Gleim—Chemist, C. H. Masland & Sons, Mechanicsburg, Pa. Sponsors: H. K. Kerr, W. Z. Leaphart.

Edwin F. Glenn—Reg. Safety Officer, Pilot, USAAF. Sponsors: A. H. Grimshaw, H. C. Chapin.

Wilbur T. Grobe—Asst. Foreman, Dye. & Bleach., General Athletic Products Co., Greenville, Ohio. Sponsors: E. J. Sindt, H. Waffenschmidt.

William T. Haggerty—Chemist, Celanese Corp. of America, Cumberland, Md. Sponsors: H. C. Chapin, E. E. Fickett.

Frank Peterson—Textile Colorist, Sidney Blumenthal & Co., Inc., Shelton, Conn. Sponsors: P. McCarthy, H. H. Taylor.

Lemuel B. Stephenson—Tech. Asst., Hartsville Print & Dye Works, Hartsville, S. C.

Associate

J. Cantey Alexander—Salesman, Corn Products Sales Co., Spartanburg, S. C.

Thomas P. Beery—Administrative Asst., The United Piece Dye Works, Lodi, N. J.

Clare W. Bendigo—Asst. Ed. Textile World, New York, N. Y.

Melville A. Bergfeld—Good Housekeeping Magazine, New York, N. Y. Sponsor: T. F. O'Brien.

Joseph M. Besso—Managing Director, Usines Textiles Al-Kahira Corp., Cairo, Egypt.

James H. Canady—Supt. Avondale Mills, Sylacauga, Ala. Sponsors: S. Pawson, O. G. Edwards.

John M. Centa—Director, Products Special Appl. Lab., Defender Photo Supply Co., Inc., Rochester, N. Y.

John F. Hagen—Engr.—Products & Tech. Developments, Callaway Mills, New York, N. Y.

Ernest Kiesewetter—Mgr. Hosiery Mill, Bossong Hosiery Mills, Inc., Asheboro, N. C. Sponsor: R. H. Smith.

Robert V. May—Foreman, Dye. & Warp Prep., Avondale Mills, Sylacauga, Ala.

Sponsors: S. Pawson, O. G. Edvard.

Charles F. MacNeil—Office Manager, Philipp Brothers, Inc., Providence, R. I. Sponsors: H. V. King, W. L. Goddard.

George R. Murphy—Treas. & Mgr. Asheville Cotton Mills, Asheville, N. C.

Thomas R. Smith—N. E. Div. Mgr., Oakite Products, Inc., Hartford, Conn.

Howard R. Peterson—Manager, Product Development Dept., Standard Oil Co. of Indiana, Chicago, Ill.

Richard Rich—Mfr. & Dyer of Furs, Richard Rich, Milwaukee, Wisc.

Myron D. Weiss—Exec. Converter, N. Fluegelman & Co., Inc., New York, N. Y.

Frederick S. Whiteside—Dir. of Purchases, Pacific Mills, Boston, Mass.

Thornton L. Woodwell—Tech. Service Repres., Oakite Products, Inc., New York, N. Y.

Arthur J. Wiesner—President & Gen. Mgr., The Wiesner-Rapp Co., Buffalo, N. Y.

Corporate

American Institute of Laundering
Archer Hosiery Mills
Better Fabrics Testing Bureau
Dundee Mills
Georgia Manufacturing Co.
Grantville Mills
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Huguet Fabrics Corp.
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Jordan Mills
Lowell Bleachery South
Mock Judson Voehringer Co.
National Rayon Dyeing Co.
North Georgia Processing Co.
Phillipsburg Textile Print Works
Price Fire & Water Proofing Co.
Russell Manufacturing Co.
Schurmann Silk Dyeing Corp.
Shannon Hosiery Mills
Spalding Knitting Mills
Stowe-Woodward, Inc.
Waverly Piece Dye Works
Worcester Knitting Co.

Additional

Senior

William R. Cleary — Salesman, Barrett Div., Allied Chemical & Dye Corp., Philadelphia, Pa. Sponsors: A. E. Raimo, W. R. Smith.

Francis S. Richardson—Textile Technician, Waldrich Co., Delawanna, N. J. Sponsors: T. F. O'Brien, F. L. Bume.

Abe Seidel—Textile Colorist, Colonial Print Works, Paterson, N. J. Sponsors: S. Glasberg, L. W. Craft.

Francis J. Sprules—Research Chemist, National Oil Products Co., Harrison, N. J. Sponsors: L. E. Rossiter, H. C. Meegan.

Photos by Dr. H. C. Chapin

Among those Present at N.N.E. Section Meeting on May 19th.

Junior

Zane S. Messinger—Colorist, General Dyestuff Corp., New York, N. Y. Sponsors: C. Z. Draves, H. E. Hager.

Associate

Lindsay Mortimer Shuford—International Salt Co., Hickory, N. C.

MEETING, NORTHERN NEW ENGLAND SECTION

THE final meeting of the 1943-44 Season of the Northern New England Section was held at the Andover Country Club, Andover, Massachusetts, on Friday, May 19, 1944.

Due to wartime conditions there was no scheduled Outing for this season, but, the facilities of the Andover Country Club were open to all members who wished to golf. An impromptu golf tournament was arranged and many members availed themselves of this opportunity.

Dinner was served at 7:00 p.m., to one hundred and fifty-one members and guests. Following dinner a business meeting was held at which officers for the coming 1944-45 season were elected, a list of which follows. John N. Dalton, Councilor, reported on plans for the coming Annual Meeting to be held at Atlantic City on October 12th, 13th and 14th, and sponsored by the Philadelphia Section.

At the technical session Christian F. Klebsattel of the Rohm & Haas Company gave an interesting talk on "What Is Ahead for Textiles." Harold W. Leitch and Alan A. Claflin supplemented along the same line, all of which will appear in publication later.

Officers, 1944-45 Season

Delbert E. Ray, Chairman; G. Clifford Emmons, Vice-Chairman; Azel W. Mack, Secretary; George O. Linberg, Treasurer.

Sectional Committee: Edwin A. Buthmann, Tom Peel, Frank J. Rizzo, J. Milton Washburn.

Councilors: Edward S. Chapin, Harry M. Hartnett, Charles H. A. Schmitt.

Respectfully submitted,

AZEL W. MACK,
Secretary.

RESEARCH LABORATORY ESTABLISHED AT LOWELL TEXTILE INSTITUTE

ON May 22nd the Executive Committee on Research met at the Lowell Textile Institute, Lowell, Mass., in order to inspect facilities which had been offered to the Association for setting up a laboratory which will be adequate to take care of its present research program. A floor space of approximately 1,200 feet was approved and the Association will take the necessary steps to equip it properly for the intended purpose.

Among other business disposed of by the Executive Committee was the reorganization of the sub-committees which are

charged with various research projects into "Active" and "Reference" committees. In several cases changes were made in personnel and chairmanships. In order to crystallize the research work for the next 12-month period, fourteen specific research projects were set up which will be assigned to the respective sub-committees.

The members of the Executive Committee on Research who visited Lowell on this occasion were:

Leonard S. Little, Chairman, E. I. du Pont de Nemours & Co., Inc., New York City.

William D. Appel, President, National Bureau of Standards, Washington, D. C.

Thomas R. Smith, Wiscassett Mills Company, Albemarle, N. C.

J. Robert Bonnar, General Dyestuff Corp., New York City.

Prof. Louis A. Olney, Lowell Textile Institute, Lowell, Mass.

OFFICERS, NEW YORK SECTION

EMMETT DRISCOLL, Sayles Finishing Plants, Inc., was elected chairman of the New York Section at its Annual Business Meeting held on June 9th, at the Downtown Athletic Club, New York City. Other officers were elected as follows: *Vice-chairman*—Dr. Herman E. Hager, General Dyestuff Corp.; *Treasurer*—Paul J. Luck, Calco Chemical Division, American Cyanamid Co.; *Secretary*—Norman A. Johnson, "American Dyestuff Reporter"; *Sectional Committee*—Ephraim Freedman, R. H. Macy & Co.; Edward H. Schmidt, Major Harold W. Stiegler, Chemical Warfare Service; George L. Baxter, Bradford Dyeing Association; *Councilors*—Kenneth H. Barnard, Pacific Mills; Patrick J. Kennedy, E. I. du Pont de Nemours & Co., Inc.; Lt. Comdr. Roy G. Buck, Bureau of Supplies and Accounts, U. S. Navy; Leonard S. Little, E. I. du Pont de Nemours & Co., Inc.; Thomas F. O'Brien, R. W. Bates Piece Dye Works.

Emmett Driscoll

A report of the meeting will appear in the near future.

CALENDAR OF COMING EVENTS

Outing, Mid-West Section, Lake Lawn, Delavan, Wisconsin, June 24, 1944.

Meeting, Southeastern Section, Callaway Institute, La Grange, Ga. September 9, 1944.

Annual Meeting, Hotel Claridge, Atlantic City, N. J., October 12, 13 and 14, 1944. Auspices of Philadelphia Section. Further details will appear in the near future.

Note: Secretaries of local sections are requested to advise the AMERICAN DYESTUFF REPORTER of meeting dates for the 1944-45 season as soon as available.

ACETYLATION OF CASEIN WITH KETENE. A. Schoberl and F. Krumey. *Beiheft. Z. Ver. deut. Chem.*, No. 45, *Die Chemie*, 1942, 55, 63-64; through *Chem. Abs.*, 1943, 37, 5513 and *J. Soc. Dyers & Col.*, May, 1944.

By acetylating casein with ketene in alkaline solution, 4.7 per cent of acetyl groups have been introduced. Assuming the mol. wt. of casein to be 35,000, acetyl casein prepared at pH 6.5-11.5 contains 12-39 acetyl groups; at pH 11.9, 19 N-acetyl groups are present and the free amino-groups have almost disappeared. Acetyl casein also contains O-acetyl groups and the two types are usually present in about equal amounts. The O-acetyl groups are readily hydrolyzed, whereas the N-acetyl groups are very stable. The peptide linkages introduced through the acetylation of amino-groups are more stable to sodium hydroxide than some of the peptide linkages in the native casein, thus increasing the stability of the acetyl casein. Acetyl casein can be spun into fibers by the usual methods, the product with the highest acetyl content requiring twice the amount of sodium hydroxide usually used with casein, probably because of the greatly increased acidic properties; acetyl casein with a low acetyl content is not soluble in sodium hydroxide, but swells to some extent.—F. F. E.

PROGRESS IN FORTISAN, THE STRONG YARN. W. Whitehead. *Rayon Text.*, 1943, *24*, 456; through *J. Soc. Dyers & Col.*, May, 1944.

Fortisan is a regenerated cellulose filament with a highly oriented structure and with its micelles firmly bound together. Filaments are produced at about 0.7 denier, yielding yarn of 30 denier and upwards, but filaments down to 0.1 denier have been prepared. The dry and wet strengths of the 0.7 denier filament yarn are 7.0 and 6.0 g. per denier, respectively, the elongation 6.0-6.5 per cent and the sp. gr. 1.5. The ratio of strength (lb. per sq. in.) to sp. gr. is 92,000, compared with 8,000 for un-annealed iron wire and 10,400-42,300 for steel. Thus, Fortisan is used where extreme strength and/or lightness in weight are required.—F. F. E.

ALIZARIN RED: APPLICATION BY A ONE-BATH PROCESS. R. Haller. *Melliand Textilber.*, 1942, *23*, 86-88; through *Chem. Abs.*, 1943, 37, 4250 and *J. Soc. Dyers & Col.*, May, 1944.

Attempts to bring aluminum and calcium alizarates, together with polymerized ricinoleic acid, simultaneously on to the fiber failed owing to the difficulty of preparing suitable emulsions, although a little gum tragacanth gave an emulsion suitable for padding. Benzene solutions of the sulforicinoleates of calcium and aluminum were mixed with an alcoholic solution of Alizarin and fabric steeped in this mixture and then steamed; the dyeing was not of optimum brightness, but the complex lake was completely formed. The mixed components of Alizarin Red form a clear solution in aqueous tartaric acid, using ammonium alizarate, but neither sugar solutions nor sulfite cellulose liquors give clear solutions of Alizarin Red. Thiodiglycol is a good solvent for Alizarin. Chlorol (an emulsion of equal parts of castor oil and 2.8° Tw. bleaching powder solution) prevents the formation of aluminum ricinoleate. In using aluminum thiocyanate in place of aluminum acetate, care must be taken to prevent tendering of the cloth. With ethyl ricinoleate and castor oil a dyeing is obtained which is rather dull, but fast to washing and chlorine. A full shade of red which is fast to washing is obtained by padding with a suspension of aluminum alizarate and calcium alizarate in an aqueous solution of diethylene glycol and Turkey Red oil. —C. L. B.

[PROCESSING AND] DYEING [MOHAIR, ALPACA, AND CAMEL, HORSE, COW, GOAT AND HUMAN] HAIR. Anon. *Dyer*, 1944, *91*, 13-14, 55-57, 93-94; through *J. Soc. Dyers & Col.*, May, 1944.

Mohair—Yarns or fabrics usually undergo one or more of the following treatments—(1) Pressure steaming without tension, e.g., for mohair pile fabrics; (2) crabbing, e.g., for linings; (3) immersion in warp form in boiling or nearly boiling water for 1 hr. or longer, e.g., for permanently curling a warp; and (4) treatment as in (3), but in hank form under tension, e.g., for setting and lustering yarn or narrow fabric. Such treatments not only enhance the natural luster and resilience of mohair, but also increase its affinity for dyes, so great care must be taken to obtain uniform treatment or level dyeing may be made impossible. The luster and resilience of mohair are easily damaged by unduly prolonged treatment in a hot alkaline bath or in a neutral Glauber's salt bath near b.p.; common salt often replaces Glauber's salt in single-bath union dyeing on this account. Mohair absorbs wool dyes with avidity. Acid dyes are usually applied from a strongly acid bath, as are also chrome dyes which are used for boot laces. The latter are dyed with afterchrome dyes, e.g. Acid Alizarine Black RV, Diadem Chrome Brown RH and Carmoisine, from a bath containing 4 per cent acetic acid, or 1 per cent formic acid or sulfuric acid. Direct cotton dyes also have great affinity for mohair, and in covering cotton the greatest care is necessary to prevent staining of the mohair. The dyeing of mohair-cotton union linings in a neutral bath must be done as quickly as possible and boiling avoided, in order to prevent crease formation or other distortions of the fabric; dyeing is best carried out at no higher than 82° C. Mohair, including pile fabrics with Sulfur Black-dyed cotton backings, may be stripped with Erasol C (L.B.H.), which does not affect the Sulfur Black; sodium hydrosulfite may also be used, but is liable to give an uneven result.

Alpaca—This fiber usually contains natural pigments, and it is frequently necessary to use the most brilliant dyes available. The same precautions have to be observed as with mohair if loss of luster and resiliency, or distortion of the fabric, are to be avoided. Alpaca yarn does not readily felt when dyed on rods in an open beck if plenty of acid is used; tape and narrow ribbon are also satisfactorily processed in this way, but wide ribbon and webbing are best scoured and dyed as a flat coil, package machines of special design being used. Yarns, ribbons or tapes are set before scouring or dyeing, otherwise severe curling may result.

Camel Hair—Although this fiber usually contains natural pigment, it has no luster and the precautions taken with mohair and alpaca are unnecessary; similarly, yarns and fabrics of camel hair are less liable to distortion. Most acid dyes show poor affinity for camel hair, except from a strongly acid bath.

Horse Hair—If of short staple, this fiber may be dyed in a circulating liquor machine in the state in which it comes from the clippers. Tail and mane hair are usually made into tresses or "trusses" before scouring or dyeing, each truss being slackly lashed with cord to hold it together during processing. The trusses are packed in a wooden beck with a perforated false bottom and, when the last layer is in place, a strong grating, or "trammel," is placed on top and secured to the beck sides to prevent the trusses from floating. The temperature of the circulating scouring liquor must not be above 49° C. or the luster will suffer. If two scouring baths are necessary, the trusses are repacked between the two baths. Cooling must be gradual or crimps may be formed in the hair. Dyeing, which is carried out in similar machines, is usually for black; Acid Alizarine Black is largely used, with an addition of 3 per cent vitriol and a temperature of 71° C. at the commencement. Body hair for upholstery is twisted into a coarse yarn which is plaited into tresses and then wound tightly on to rods

termed "formers." The charged formers are packed into low-pressure kiers and boiled for 1½ hr. under 20 lb. pressure with 2 per cent (on the weight of the hair) of dichromate. After cooling and thorough rinsing, they are treated similarly with 4 per cent Hematine crystals. Logwood is unaffected by kier-boiling and gives better penetration than synthetic black dyes, but it tends to give dyeings which dust. In order to avoid this dustiness, each tress, after removal from the "former," is worked by hand in warm soapy water for 1 min., passed through squeezing rollers, rinsed well in lukewarm water, squeezed again and dried.

Cow Hair—Beast's hair, as cow's hair is termed in the North, besides frequently containing a good deal of lime, also contains dry manure husk which can only be covered with direct cotton dyes. It is largely used both for knitted and needle loom felts. Needle loom felts must be dyed as quickly as possible in order to prevent undue flockage, as the cow hair is only loosely anchored to the hessian foundation. Union dyes are generally used. It is prefable to dye the hessian deeper than the cow hair, which is easy, as the hessian has much more affinity than cow hair for direct cotton dyes. De-liming is carried out by immersion for several hours in hydrochloric acid, but it is often necessary first of all to pass the cow hair through a special machine which breaks up the calcareous clots and extracts much of the dust. Cow hair for fancy woolens which are to be soap milled is dyed with chrome dyes, using acid milling dyes for shading.

Goat Hair—This fiber resembles mohair in the care required to prevent loss of luster. It has fairly good affinity for wool dyes.

Human Hair—After forming into tresses, the hair is degreased with a warm solution of a sulfated fatty alcohol or borax. Very dirty hair must be sterilized by steaming under pressure or boiling for 30 min. In order to keep the fibers as straight as possible, each tress of hair is drawn into a 0.5 in. brass or copper tube containing numerous small perforations, the tress just comfortably filling the tube. Stripping is a multi-bath process, the hair being first immersed in a lukewarm solution of iron sulfate, brown tartar crystals and common salt for 24 hr. The surplus liquor is then shaken out of each tress, which helps to remove irregularities from individual hairs. The hair is next immersed in lukewarm peroxide for 10 hr., and then treated in a solution of Erasol C (L.B.H.), hydrochloric acid and common salt at 93° C. for 1 hr. If insufficiently decolorized, it may be given another peroxide bleach in presence of a little glycerol. The harsh handle developed by the hair is removed and the luster improved by treating in a lukewarm aqueous solution of emulsified bone oil and olive oil soap for 15 min. The hair is then taken from the soap bath, shaken well, combed and dried. Mongolian hair has often to be reduced in diameter to that of European hair; this is done by steeping in cold hypochlorite, e.g. of 0.5° Tw., for 48 hr., from time to time comparing the actual diameter microscopically with that required and making adjustments to the solution. The hair is finally rinsed, treated in dilute hydrochloric acid, and lustered in a warm bath of bone oil and soap. Short staple human hair, e.g. barbers' clippings, is scoured and dyed in coarse cotton bags. Either chrome dyes or acid dyes may be used for human hair.
—C. O. C.

TRADE NOTES • NEW PRODUCTS

OBITUARY

WILLIAM M. GROSVENOR

DR. WILLIAM M. GROSVENOR, retired chemist and chemical engineer, died on May 30th after a long illness. He was 70 years old.

He was born in St. Louis, attended Root's Academy in Greenwich, Conn., received a B.S. degree in 1893 from Brooklyn Polytechnic Institute, did post-graduate work at Johns Hopkins University, and received, in 1898, a Ph.D. from the University of Pennsylvania.

Mr. Grosvenor was employed by a number of concerns in the chemical field including the Mathieson Alkali Works, Inc., Ampere Electrochemical Co., General Chemical Co., Contact Process Co., George F. Westcott Co., and the Dryer Engineering Co. From 1907 until 1940, when he retired, he was a consulting chemist and chemical engineer with his laboratories in New York. During this period he served many leading firms as an expert witness in patent litigation.

During the first World War he served as a member of the Textile Committee of the Council of National Defense and developed processes for the manufacture of dyestuffs formerly made in Germany and the use of mohair in powder bags. He held a number of patents for chemical processes.

Dr. Grosvenor was a member of many technical societies and contributed to a number of professional journals.

He is survived by his widow, a son William M., Jr., who now manages the Grosvenor laboratories, and a daughter.

• THE STORY OF DDT

Recent official announcements of the effectiveness of one DDT composition (Neocid) in eradicating typhus in Italy and elsewhere have recently brought this creation of chemistry to public notice. Military regulations has kept much information regarding DDT a secret, and the Geigy Company, Inc., 89 Barclay Street, New York, has just made available certain facts.

DDT (dichloro-diphenyl trichloroethane) was synthesized in 1874 by a young German chemistry student, Othmar Zeidler, in Strasbourg. He regarded it merely as a casual test tube evolution of no particular significance and recorded it in a brief six-line notation in the Proceedings of the German Chemical Society.

Several years ago, Paul Muller, scientist of J. R. Geigy, Basle, Switzerland, synthesized the product and discovered the insecticidal values inherent in the formula. Geigy made available to the Swiss Federal Experiment Agricultural Station a composition of the product which was later called "Gesarol." Through experiments conducted by this Station its insecticidal properties were confirmed, which culminated in the control of the destructive potato beetle.

In 1942 Geigy informed Major De Jonge, American Military Attache in Berne, that Neocid, the lousicidal composition of DDT, had proved amazingly effective against the typhus carrying louse, and that it possessed incredible residual potency, an important factor. Geigy simultaneously notified its New York subsidiary of its discovery.

Experiments by the U. S. Department of Agriculture confirmed Geigy's claims and attracted the attention of Colonel William S. Stone of the Surgeon General's Office and the Office of Scientific Research and Development. Colonel Stone's direction was a great spur in bringing this lousicide from the research stage to adoption by the armed forces. Simultaneously, greenhouse investigations were started by various agencies, which will permit as early use of DDT compositions for agricultural pests as will be permitted by the military organizations.

The manufacture of DDT was begun by the Cincinnati Chemical Works in May, 1943. Since January 1st of this year three other companies have produced DDT and have accounted for 40 per cent of total production, Cincinnati producing 60 per cent.

It is stated that Geigy, in cooperation with the Cincinnati Chemical Works, was largely responsible for the louse powder which conquered the recent typhus epi-

demic in Naples. Up to date, the quantity manufactured in the Cincinnati Chemical Works has been sufficient to protect over 50,000,000 individuals against typhus for one month. During last January, in the Naples area alone, there were several million applications by the Neocid dusting procedure.

Other compositions of DDT in emulsion form have been used to impregnate clothing. It is claimed that the lethal effectiveness against the typhus bearing louse is retained for a month or longer in impregnated clothing, despite several normal launderings.

As experiments develop, other disease-preventive and insect-killing possibilities have come to light.

DDT compositions are required by the military and naval forces in such tremendous quantities that for the time being none is available for civilian use.

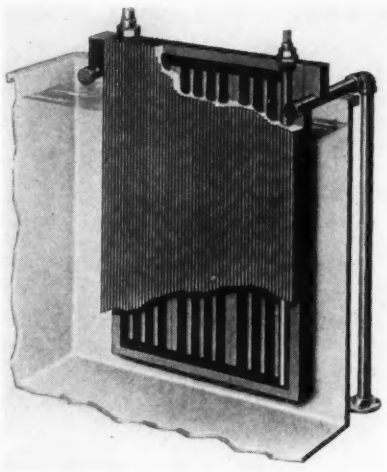
• NEW HEAT EXCHANGER

A new type of heat exchanger, made of "Karbate" chemically inert graphite materials, has been perfected for use in chemical and process industries by National Carbon Company, Inc., it was announced recently. Designed specifically for chemical applications, the corrosion resistant "Karbate" heat exchangers possess high heat transfer values and are resistant to practically all acids, alkalis and solvents, it is stated. They are said to be unaffected by acute thermal shock and may be used freely in intermittent operations, or in alternately hot and cold chemical baths.

Of plate type, the heat exchangers employ the principle of extended, or corrugated surface to attain maximum heat transfer area within small overall size. The compactness of the exchangers increases their inherent mechnical strength. At the same time, it reduces the tank space required for the heaters, further minimizing the hazard of mechanical shock during process operations. As shown in the illustration, the heater is a 4 inch thick plate with a number of internal 1½ inch diameter communicating channels for steam or cooling medium.

National Carbon Company standardized production of the heat exchanger units in four design groups, incorporating both parallel and series flow channels, thus making possible 30 different combinations to meet the widest range of heating and cooling requirements. The heaters may be installed in sections, depending upon tank capacity or solution temperatures required, and are suitable for nearly all tank sizes or shapes.

A number of the heat exchangers have been in use in various processes for a year or more and afford sufficient service data for comparative purposes. Such heaters, 4 in. x 10 in. x 48 in. in size, operating



"Karbate" Heat Exchanger

on 25 lbs. steam and maintaining tank temperatures of 180°-190° F. have been in service in approximately 10 per cent nitric acid and 3 per cent hydrofluoric acid in tanks measuring 3 ft. x 4 ft. x 4 ft. There is said to be no visible sign of deterioration in these units in the year or more of their operation. In the same application, no metal heat exchanger has been found that would stand up for more than a few days, it is stated.

In other types of corrosive chemical operations, the "Karbate" corrugated plate heaters have greatly increased heating efficiency and reduced process costs through longer service and through eliminating maintenance costs.

• NEW GENERAL MANAGER

Felix N. Williams, former production manager of the Phosphate Division of Monsanto Chemical Company, succeeds John C. Brooks as general manager of the Plastics Division. Mr. Brooks, who died April 26, was general manager of the division since its acquisition by Monsanto in 1938.

As production manager of Monsanto's Phosphate Division, Mr. Williams had made his headquarters at Anniston, Ala. He will assume his new duties at Springfield.

• ANSUL APPOINTMENT

Ansul Chemical Company, Marinette, Wis., announces the appointment of Carl L. Wallfred of the Batelle Institute, Columbus, Ohio, as manager of its Pilot Plant Department. Mr. Wallfred, a graduate chemical engineer of the University of Minnesota, who was a metallurgist at the Batelle Institute, took over his new work at Ansul on April 1.

• APPOINTED SECRETARY

Leroy S. Converse of the Standards Department of the American Viscose Corporation, has been appointed secretary of the Tire Cord & Fabrics Section, Committee D-13 on Textile Materials, of the American Society for Testing Materials, it was announced recently. This appointment also makes Mr. Converse a member of the General Advisory Group Committee D-13.

• A.S.T.M. SYMPOSIUM

Recently off the press is the Symposium on Mildew Resistance comprising four technical papers and discussion presented before the American Society for Testing Materials Committee D-13 on Textile Materials. The papers and their authors appearing therein are: The Problem of Standardizing Test Methods for Mildew and Rot Resistant Treatments of Textiles, H. D. Barker, G. A. Greathouse, and P. B. Marsh, United States Department of Agriculture; Evaluating Fabric Treatment for Mildew or Rot Resistance by Pure Culture Methods, G. A. Greathouse, P. B. Marsh, and H. D. Barker; Testing Mildew Resistance of Treated Fabrics by the Soil Suspension Method, Margaret S. Furry, U. S. Department of Agriculture; Observations on Soil-Burial Procedures, Elmer C. Bertolet, Jeffersonville Quartermaster Depot.

Copies of this 40-page pamphlet can be obtained from the American Society for Testing Materials, 260 S. Broad St., Philadelphia 2, Pa., at 65 cents each.

• AWARDED JOHN WESLEY HYATT MEDAL

The nation's most distinguished award for achievement in the plastics industry—the John Wesley Hyatt gold medal—was presented on May 11, to Dr. Stuart D. Douglas, head of Plastics Research, Carbide & Carbon Chemicals Corporation, South Charleston, W. Va.

Dr. Douglas was selected by the Hyatt award committee to receive the third annual presentation of the medal for his work in polymerization of vinyl resins. The award, which is sponsored annually by Hercules Powder Company, and carries with it a cash gift of $1,000, was made at a luncheon during the annual conference of the Society of the Plastics Industry.

The accumulated results of Dr. Douglas' work, in the opinion of the award committee, constituted the outstanding achievement in the plastics industry during 1943.

The presentation which was made in the Marine Room of the Edgewater Beach Hotel, Chicago, Ill., at a special award luncheon of the Society of the Plastics Industry, was attended by more than 1,200 members of the society including members of the John Wesley Hyatt Award Committee, and honor guests. Dean Richard F. Bach, of the Metropolitan Museum of Art, was toastmaster of the presentation ceremonies.

The presentation was made by Dr. Carl Shipp Marvel, professor of Organic Chem-

istry at the University of Illinois and president-elect of the American Chemical Society.

● GLYCO APPOINTMENT

The Glyco Products Company, Inc., Brooklyn, New York, through its vice-president, Mr. E. Rosendahl, announces the appointment of Dr. Eugene McCauliff as technical sales director of the company. Dr. McCauliff is a graduate of Fordham University, where he received his Ph.D. in organic chemistry in 1931.

Dr. McCauliff has recently been engaged in consulting and advisory activities for the chemical industry, in which capacity he initiated many process developments and designed chemical pilot plant and production installations. A great deal of his efforts were employed as technical director of sales for the Duff Chemical Company of New York City. Before this he was associated for some time with the Industrial Synthetics Corporation, prior to which he was attached to the sales department of the Hooker Electrochemical Company for many years, particularly assisting in the sales development of fine chemicals.

In his new position, Dr. McCauliff will devote his time to the technical sales development of the esters, synthetic waxes, emulsifying agents, etc., manufactured by Glyco.

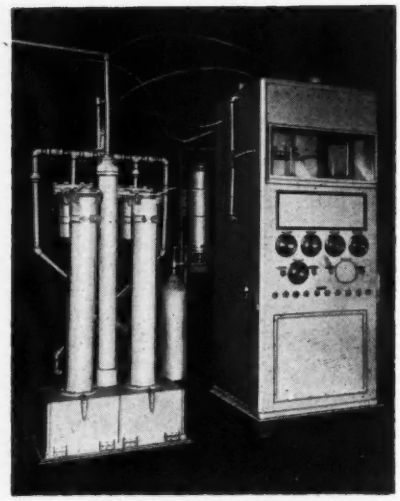
● FABRIC AND YARN RESISTANCE

A method for treating cellulosic yarns and fabrics by means of an alkyd-urea-formaldehyde resin mixture to render them resistant to heat, acid, and alkali forms the basis of U. S. Patent 2,341,735 granted to B. Monsaroff. The first step in this process is the formation of a water-soluble alkyd resin by causing one mole each of glycerine, phthalic anhydride and triethanolamine to react at a temperature not exceeding 160°C. The alkyd resin so formed is used in an aqueous solution which also contains an equal proportion of a water-soluble urea-formaldehyde resin. The material is impregnated with this solution after which the fabric is dried at about 150°C. to form a heat, acid and alkali resistant film on the textile material.

● NEW CHLORITE-CHLORINE PROCESS

A new dry chlorite-chlorine process, which makes the powerful oxidizing and bleaching compound chlorine dioxide available for industrial purposes, was described at the recent meeting of American Institute of Chemical Engineers by E. R. Woodward of The Mathieson Alkali Works.

Because of its instability, chlorine dioxide must be generated at its points of use. The development of a method which makes this practical is expected to be followed by various industrial applications, since the oxidizing power of chlorine dioxide in terms of "available chlorine" is 2½ times that of chlorine.



Equipment for Producing Chlorine Dioxide.

Chlorine dioxide is said to have specific values in improving taste in public water supplies, checking blue mold in citrus fruits, and reducing spoilage in canned foods. On an experimental scale, sterilizing the atmosphere with chlorine dioxide increases the yield of penicillin, it is stated.

In the maturing and bleaching of flour, chlorine dioxide is said to demonstrate its superiority over other chemicals, and it is expected to prove useful also for bleaching such products as starch, soap, paper and textiles.

● 3RD NAT'L CHEMICAL EXPOSITION

The 3rd National Chemical Exposition to be held Nov. 15 to 19 at the Coliseum in Chicago will not only stress the importance of the chemical industry in the war effort but will reveal much that is planned for the postwar era, according to its sponsor, the Chicago Section of the American Chemical Society.

M. H. Arveson, chairman of the show committee, announces that space is already about gone. Despite the fact that more than twice the area of the two preceding expositions has been made available for exhibitors, there is early indication, he says, that some late applicants may not be accommodated.

An important feature of the show again this year will be the National Industrial Chemical Conference. Noted authorities on virtually all phases of pure and applied chemistry will appear on the program at the various sessions to be held during the five-day period. All sessions are scheduled for the conference hall on the second floor of the South Annex, which may be entered directly from the show.

● NEW BOOKLET

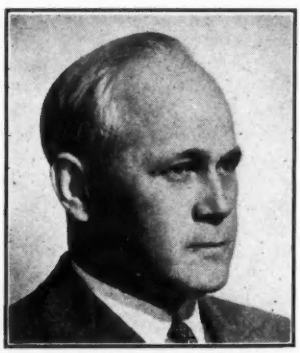
National Adhesives Division National Starch Products, Inc., has just published a new booklet entitled "The What, Where, Why, How of *Resyn* Adhesives."

This information booklet traces the development of synthetic resin adhesives, defines the trade terms associated with them, describes their unique properties, suggests applications for them and outlines procedures for handling various types of resinous products. Its 16 pages are written in terse, non-technical language and printed in two colors.

Copies of the booklet can be obtained by writing to National Adhesives Division, National Starch Products, Inc., 270 Madison Avenue, New York 16, N. Y.

● ELECTED PRESIDENT, CARBIDE & CARBON

Dr. Joseph G. Davidson has been elected President of Carbide and Carbon Chemicals Corporation and Carbide and Carbon Chemicals, Ltd., Units of Union Carbide and Carbon Corporation. Dr.



Dr. Joseph G. Davidson

Davidson holds degrees in chemistry from the University of Southern California and Columbia University. He participated in the early work in synthetic organic chemistry which led to the foundation of Carbide and Carbon Chemicals Corporation. He has served in this company in technical and executive capacities since its formation, having been Vice President in charge of sales during the last 12 years.

At a recent meeting of the Board of Directors the following were elected Vice Presidents: L. J. Bowditch, W. S. Brackett, H. S. Bunn, G. T. Felbeck, R. N. Graham, G. B. Landes, H. B. McClure, W. F. Reich, Jr

● NEW PLANT

W. H. & F. Jordan, Jr. Mfg. Co., located at 3047 Amber St., Philadelphia, for the past twenty years or more, announces their removal to larger quarters due to

the increased volume of sales and the required expansion of plant and laboratory facilities. The new plant, which provides more than three times the floor space of the former location, is situated at 2126 E. Somerset St., Philadelphia 34, Pa.

● ELECTED SECRETARY

At a recent meeting of stockholders, William A. Whiteside was elected secretary of Quaker Products Corporation, Conshohocken, Pa., manufacturers of chemical specialties for the metal working and textile industries.

Mr. Whiteside has been with the firm for the past 12 years, serving in the capacity of personnel and office manager. A veteran of World War I, he is a member of the American Legion of the Conshohocken Lions Club and was recently elected president of the Conshohocken Industrial Soft Ball League.

Other officers of Quaker Chemical Products Corporation are: pres., D. J. Benoliel; v. pres., L. O. Benoliel and Emil Niessen; treas., Frank Batchelor.

● APPOINTED DIRECTOR OF RESEARCH

Ernest Nathan, President of Warwick Chemical Company announces that Leonard Shapiro has been promoted from the position of Research Assistant to Director of Textile Research, in which capacity he will work directly under Raymond A. Pingree, Chemical Director.

Leonard Shapiro

Mr. Shapiro is a native of New York, and studied Chemistry at the Massachusetts Institute of Technology, where he obtained his Master of Science degree in 1936.

Mr. Shapiro's textile experience began with his work as an assistant to Professor E. R. Schwartz at M. I. T. Following this he spent seven years as Chief Chemist and Director of Laboratories and Research at Interlaken Mills. He has been with the Research Department of the Warwick Chemical Company for a year and a half. His present advancement is one further step in the streamlining of Warwick's Laboratories which are busy developing chemicals for the Armed Forces, as well as working on new postwar problems.

● ONYX FORUM

At the Onyx Forum held at the plant of Onyx Oil & Chemical Co., Jersey City, N. J., on May 15th, Arthur R. Wachter, American Viscose Corp., spoke on the "Crown Test Plan." A motion picture, "Rayon—The Frontier of Progress," was exhibited. Shown in the photograph above are, left to right, W. H. Stuart, Onyx; R. R. Riegner, American Viscose; Arthur R. Wachter, American Viscose; Victor H. Berman, Onyx; A. J. Heinzmann, American Viscose, and Walter Stump, American Viscose.

This was the last Oynx Forum until the Fall. They have been held for the past four years.

● SOUND WAVES MEASURE ELASTICITY OF HOSIERY YARN

Sound waves, which have been put to a variety of unusual scientific tasks in the past, have now been assigned the job of appraising women's hosiery yarns.

Two Du Pont scientists, Dr. J. W. Ballou and Dr. Shirleigh Silverman, told the American Acoustical Society at its meeting in New York how they had aimed a very high note, above the highest whistle range of man or piccolo, at nylon stocking yarn and at other textile fibers. Purpose of the work was to measure accurately the elasticity of the fibers.

The specific property measured by the 10-kilocycle (10,000 cycles per second) sound waves is expressed as Young's modulus of elasticity, which indicates the extent to which material is elongated when a stretching force is applied. The usual method of measuring this factor in fibers has been to hang weight on the fiber and note the load required to bring about a certain amount of stretch. But Dr. Ballou and Dr. Silverman pointed out that this slow application of the force or load often not only produced elastic stretch but also permanent deformation, which spoiled the results.

To find the value of the elastic component alone, they argued, it is necessary to apply a small force rapidly—in other words, stretch the material so little and so quickly that it doesn't have time to get permanently out of shape. Passing sound through the fiber or film does just this. It causes the material to go through rapid stretching and recovery as it vibrates. This application of sound, the Du Pont scientists said, had been previously used by two other investigators, Meyer and Lotmar, but in a less versatile form than the one described in this paper.

Since velocity of sound through any medium, whether it be air, water, rayon, nylon, cellophane or steel, is determined by two properties of the medium, its density and its modulus of elasticity, it is necessary only to find out how fast sound passes through the test material (the density of which is already known) to calculate its elastic modulus. The Rayon Technical Division apparatus, therefore, is set up to measure the velocity of sound through the fiber or film.

To one end of a horizontal bar of steel, about eight inches long, is fastened the test fiber or strip of film. The other end of the material is strung over a pulley and held taut by a weight. When a radio tube audio oscillator is turned on, the steel bar vibrates at the 10-kilocycle frequency, emitting a very high note. The sound energy passes along through the test fiber or film, which in turn vibrates like a violin string. The wave-length of these vibrations is accurately measured with a sliding crystal and this figure, with the frequency (which is known), enables one to calculate the velocity of the sound.

The method, Drs. Ballou and Silverman said, gives elastic modulus values two or three times those obtained with the slow loading or static method and more closely reproduces the type of strain which will be imposed on many materials in actual use, such as the fabric and the rubber going into tires. Here the load is applied very rapidly to any one part of the tire, as it revolves along the road at high speed.

The set-up is said to be so simple that it can be placed in a closed chamber for measurement of the modulus under a wide range of temperatures and humidity.

• PROPOSED MERGER

Standard Coated Products Corp., 40 Worth Street, New York, N. Y. has called a special meeting of stock holders to take action upon a proposed merger with Interchemical Corporation. Standard Coated Products Corporation manufactures and sells "Sanitas" Coated Fabric Wall Covering, "Meritas" Table Oil Cloth, "Damask" Pyroxalin Coated Table Covering and is at present largely engaged in the production of coated and combined fabrics for use by the armed forces, primarily the Navy.

The proposed merger is based upon the belief that the business of Standard Coated can be more effectively carried on if it is a part of a larger corporation such as Interchemical, having well established research facilities and diversified interests in the chemical coatings industry as a whole.

This merger marks another step in Interchemical Corporation's broadening interest in the field of coated and treated fabrics, having acquired, some time ago, a controlling interest in the stock of Cotan Corporation. Cotan Corporation manufactures coated fabrics such as artificial leather, upholstering fabrics and other chemically treated and coated fabrics for many purposes.

• RESEARCH DAY IN BOSTON

The seventh annual "Research Day in Boston" was held on May 26th at the Hotel Statler. The 1944 observance saluted the Textile Industry and its contribution to the war program and to industrial progress.

The luncheon program was presided over by Dr. Lawrence W. Bass, Chairman of the 1944 Research Day Committee and Director of the New England Industrial Research Foundation, Inc. Speakers were Hon. Sinclair Weeks, U. S. Senator from Massachusetts, "How Shall We Pay for the Peace?" and Colonel Georges F. Doriot, Military Planning Division, Office of the Quartermaster General, U. S. Army, "Research in Battle Dress."

Prof. Edward R. Schwarz, Head of the Textile Division, Massachusetts Institute of Technology, presided over a panel discussion on "Textiles Today and Tomorrow" which took place in the afternoon. Speakers on the panel included: Lt. Comdr.Roy G. Buck, Bureau of Supplies and Accounts, U. S. Navy; Giles E. Hopkins, Director of Applied Research, Textile Research Institute; Miss Esther Lyman, Merchandise Editor, *Harper's Bazaar;* Dr. W. Rupert Maclaurin, Professor of Economics, M.I.T.; Comdr. W. F. Prien, Brooklyn Naval Clothing Depot; Lt. Col. John H. Talbot, Commanding Officer, Climatic Research Laboratory, Quartermaster Corps, U. S. Army; Wing Comdr. Peter W. Webb, Research and Development Branch, Office of Quartermaster General, U. S. Army.

There were a number of exhibits on display, including the following:

Military clothing of today and yesterday, exhibited by live models; also specimens and photographs of textile equipment used in certain theatres of the war, and exhibits from the Climatic Laboratory. *Office of the Quartermaster General, Research and Development Section, and Quartermaster Corps, U. S. Army.*

Exhibits and photographic presentations of various types of textile testing methods. *Textile Division, Massachusetts Institute of Technology.*

Examples of uses to which glass fibers may be put in the textile field. *Owens-Corning Fiberglas Corp.*

The various stages of the production of fibers from wool and redwood bark fibers. *Fabric Research Laboratories, Inc., in cooperation with the Pacific Lumber Co. and Lowell Textile Institute.*

Literature of pertinent interest to the textile industry concerning foreign textile developments. *Office of Alien Property Custodian.*

First fabric ever woven from cellulose acetate fiber. *Arthur D. Little, Inc.*

Enlarged photo-micrographs of surfaces and interior cross-sections of fused collars; 3 dimensional photo-micrographs as applied to the study of textiles. *Gustavus J. Esselen, Inc.*

Exhibit in connection with materials processed by the cotton system. Research and use of knitted fabrics. Research in the development of special woolen and worsted yarns and fabrics. *Lowell Textile Institute.*

Research on means to improve the color fastness of olive drab Army fabrics. Apparatus for evaluating waterproofness and water repellency of fabrics, with samples to illustrate. Apparatus for evaluating crocking. *American Association of Textile Chemists and Colorists.*

The program was sponsored by the Boston Chamber of Commerce in cooperation with a number of interested groups which included a number of textile associations, schools, laboratories and chambers of commerce in cities adjacent to Boston.

• DYESTUFF SOLVENT

"Kromfax" solvent is a dyestuff solvent now being offered by Carbide and Carbon Chemicals Corporation, a Unit of Union Carbide and Carbon Corporation. "Kromfax" solvent ($HOCH_2CH_2SCH_2CH_2OH$) can usually be used to replace all or part of the glycerol, acetin, diacetin, or triacetin used in dissolving textile colors. It is particularly useful in pasting difficultly soluble basic dyestuffs in direct printing, it is stated.

"Technical Information" sheets on "Kromfax" solvent are available. To obtain a copy, it is requested that the reader write Carbide and Carbon Chemicals Corporation, 30 East 42nd Street, New York 17, N. Y., asking for Form 5764.

• INTERNATIONAL OFFICE FOR EDUCATION

The American Association for an International Office for Education was formed in December of last year to enlist support for the establishment of an International Office for Education. Its officers are: Dr. Harlow Shapley, president; James Marshall and Msgr. George Johnson, vice presidents; Sylvan Joseph, treasurer and Mary French, executive secretary.

The organization supports the establishment on the assumption that no peace program will be complete which fails to place education on a parity with political organization, police, distribution of raw materials, the stabilization of currencies and raising standards of health. It is stated that such things can be pacifiers but they cannot bring peace unless the people who support them are imbued with ethical ends, unless they can shed a large part of their aggressive spirit and learn to be cooperative.

It is further stated that education, teachers, schools are the process, the personnel and the institutions which must in large measure bring this about if there is to be any hope for an enduring peace.

It is claimed that an international organization for education with a permanent secretariat—an international education office—can be an instrument to create healthier relationships between people and through them between nations. It is stated that it can materially contribute to the peace of the world by helping to improve educational standards, to clarify educational aims and to foster intercultural fellowship and understanding.

Organizations and individuals representing all elements of the American people are joining in support of the Association's objectives.

The address of the American Association for an International Office for Education is 135 West 44th Street, New York 18, N. Y.

What Does This Net Hold For You?

A STRANGE CAREER for a net . . . originally used for catching shrimps, it now camouflages jeeps, tanks and trucks up on the firing lines. And at that, it holds a message for textile men!

Originally, the resin emulsion pigment used for camouflage coloring was applied to the netting with a solvent that was highly inflammable. In addition, the solvent was obnoxious to apply. Obviously, these factors hindered rapid manufacture.

That was the situation as presented to Calco research laboratories . . . with the reminder that time was of the essence.

Yet despite the fact that it was necessary to work against time . . . our chemists were able to come up with the right answers. The Calco resin pigment developed for camouflage nets uses a non-inflammable solvent and is not obnoxious to apply. Furthermore, Calco's formula contains agents for mildew, flame and weather proofing. And the color is light fast.

In this single example of Calco's research versatility, you'll find still another reason for counting Calco Technical Service and dyestuffs in *your* post-war plans.

For the research at Calco devoted to improving dyes for war use will make its mark in postwar applications as well. Whatever phase of color for textiles you're particularly interested in . . . you can be sure that Calco will have news for you on V-day!

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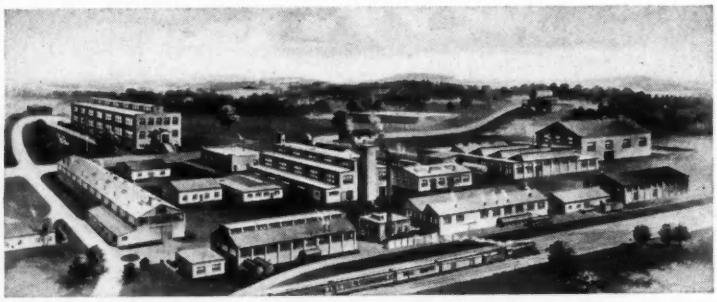

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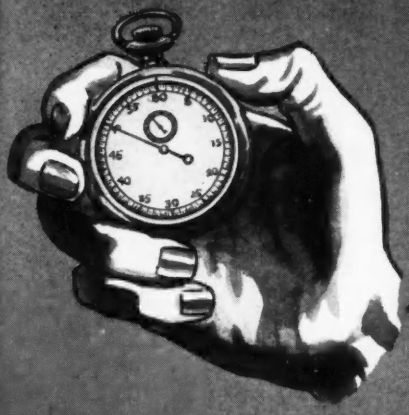

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TEMP. (° C.)	25	50	70	25	50	70	25	50	70
CONCENTRATION	DRAVES TEST, FIGURES BELOW SHOW TIME IN SECONDS REQUIRED FOR STANDARD SKEIN TO SINK								
½%	3.5 SEC.	3.7 SEC.	3.8 SEC.	8 SEC.	3.2 SEC.	0 SEC.	39.5 SEC.	15.0 SEC.	13.8 SEC.
¼%	10 SEC.	11.5 SEC.	15 SEC.	10.7 SEC.	4.8 SEC.	3.2 SEC.	127.5 SEC.	70.0 SEC.	66.8 SEC.
⅛%	84 SEC.	81 SEC.	66 SEC.	16.3 SEC.	8.3 SEC.	6.5 SEC.			

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ALRONAL 90 and Alrosene 23 LS are characterized by outstanding detergent properties and are noted for their penetrating and wetting efficiency on all types of fabrics in acid or alkaline media, in hard water or in the presence of metallic salts, such as iron, chromium, aluminum, etc. Because of this, they are effective where other wetting agents cannot be used.

SORBIT AC is primarily an acid wetting agent and has no detergency. It is most widely used in the woolen and worsted industries.

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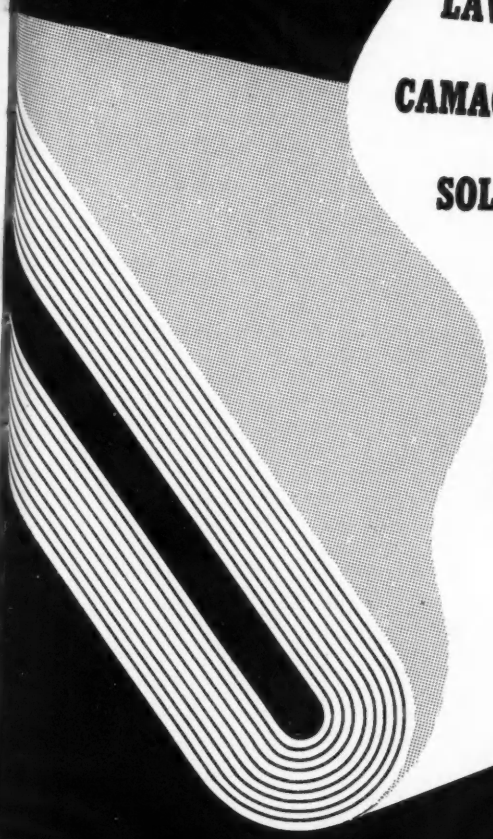

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Your rayon warps will be smoother, stronger, cleaner, more resilient and more resistant to atmospheric action if you use Laurel Rayon Size. Unlike ordinary sizes, Laurel Rayon Size penetrates and envelops the yarn—binds the filaments together. It reduces chafing and breakage, increases elasticity, equalizes variations in yarn tension. Does not shed. Removed quickly and easily in regular scour. Laurel Rayon Size gives high loom efficiency. Leaves cloth soft, smooth with good appearance and minimum defects.

Sizers and weavers throughout the industry tell us Laurel Rayon Size simplifies and speeds the weaving process. If you are not now using Laurel Rayon Size, save time and costs by sending for a trial order today. Available for immediate delivery. Our Laboratory Technicians will gladly recommend a formula to meet your exact requirements.

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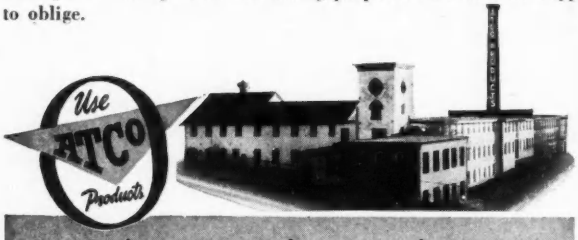

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CHEMICAL TECHNOLOGY OF THE FIBERS

By LOUIS A. OLNEY
Professor of Chemistry and Dyeing
LOWELL TEXTILE INSTITUTE

$2.50 per copy

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The intrepid exploits of our naval forces in all theatres of war are adding new glory to the proud achievements of the U. S. Navy—*fighting men true to the tradition of the boys in Navy Blue.*

Helpful in the preparation of *true blue* Azo dyes for Navy Blue is SOLVAY Sodium Nitrite. This pure, free-flowing crystal is especially suited for manufacturing dyes and for textile dyeing. For dyes that won't die—specify SOLVAY Sodium Nitrite—and be sure of highest quality!

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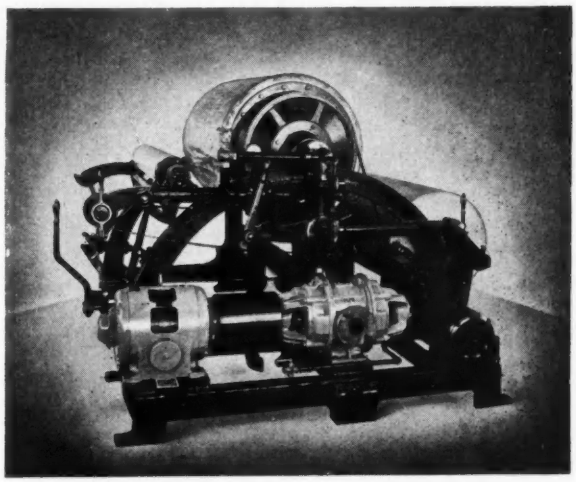
For Better Finished Fabrics

USE THIS EFFICIENT VAN VLAANDEREN DECATER



Decating corrects a harsh hand, breaks or cracks, excessive lustre, and the appearance of cloudy or blotchy dyeing in crepes.

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The latest type of Van Vlaanderen decater has been improved to meet modern production needs.

Special features of this Van Vlaanderen machine include larger, improved clutches, assuring greater smoothness of operation. Also, Van Vlaanderen patented blanket drying cylinder that draws air continuously through the blanket. This prevents the blanket from becoming overloaded with moisture and results in uniform decating and longer blanket life.

With this decater a single operator is required for efficient operation.

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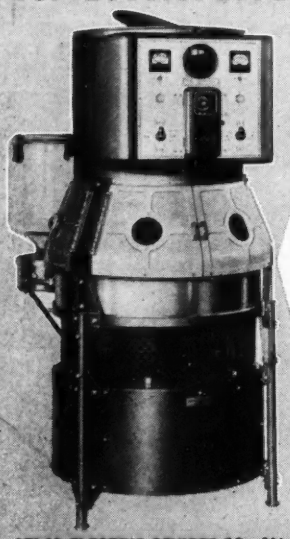

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Specimens are rotated around the Atlas Enclosed Violet Carbon Arc—the closest approach to natural sunlight. Temperature automatically controlled. No loss of light intensity of arc during life of machine.

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• Classified Advertisements •

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $6.25 per column inch or less per insertion.

WANTED: Experienced dyer, 30 to 40 years of age, for skein and package dyeing of silk, nylon, cotton, and other synthetic threads. Chemistry background and education important. Capable of handling men in dyehouse and supervising laboratory work. Plant in New England. Box 558.

POSITION WANTED: Graduate Chemist, 15 years experience in dyeing and finishing plant control and development. All types of dyestuffs and fibres. Broad experience in development of specialty resin finishes and coatings. Thoroughly familiar with all types of textile processing machinery and equipment. Desires position in technical service division of progressive chemical concern. Available June 15th. Box 560.

WANTED: Chemist. Permanent routine work in southern textile laboratory. State age, education, draft status, previous experience and salary desired. Box 561.

POSITION WANTED: Textile chemist, over 15 years of practical experience with leading dyeing and finishing organizations as research-chemist desires connection with progressive organization. Experienced in formulating special finishes for the textile, metal and leather processing industries. Draft exempt. Box 563.

WANTED: Textile chemist for dyeing and finishing plant. Location—Rhode Island. Experience in testing of chemicals and dyestuffs necessary and knowledge of heavy starch finishes and coatings with pyroxylin lacquers is desirable but not essential. Box 564.

WANTED: Will purchase Naphthol AS-DB at current market prices from anyone who has same to offer. Send full information Box 566.

WANTED: By plant located in New England, graduate dye chemist familiar with dyeing all textiles. Must have successful record with broad experience. Permanent position with good opportunity. Salary commensurate with ability. State education and experience in detail. Box No. 568.

POSITION WANTED: Dyestuff representative, graduate chemist, foreign sales expert, interested in securing new connection for sale of dyestuffs and chemicals. Box 569.

WANTED: A progressive research organization has an opening for an assistant on the chemical staff. Applicant should have thorough knowledge of organic, analytical and elementary physical chemistry. Experience in textile field desirable. Salary commensurate with training, experience and ability. Compliance with WMC Regulations required. Address application, with full details, to Callaway Institute, Inc., LaGrange, Georgia.

POSITION WANTED: Dyer, 48 years old, wishes position as salesman or demonstrator where 24 years of experience processing and dyeing all fibers would be helpful. Box 570.

POSITION WANTED: Textile chemist, College graduate, citizen, honorable discharge, long experience here and abroad in manufacturing and demonstrating of textile chemicals. Also 8 years' experience in textile dyeing, printing and finishing. Executive ability. Available immediately. Box 571.

WANTED: Textile chemist. Good opportunity in New England with large dyestuff manufacturer for chemist experienced in application of dyestuffs on union fabrics. Give draft status and full experience in first letter. Box 572.

NOTE

Essential employees need release statement. Employees who are to be hired for critical occupations need release statement and U. S. E. S. consent.

Stay at Your Battle Stations!

MANAGEMENT • LABOR

—the 5th War Loan Drive is still on.

July 29th is the last pay day in the Drive.

The U. S. Treasury has set the overall goal at $16,000,000,000 —$6,000,000,000 from individuals alone. This is the biggest sum ever asked of the American people—*and it must be raised!*

Keep fighting. The 5th War Loan is a crucial home front battle of tremendous importance to the total war effort.

Tighten up your 5th War Loan Drive organization. Step up your solicitation tempo. Drive! Drive!! Drive!!! Hit your Plant Quota's 100% mark with a bang that'll proclaim to all the world that the U. S. Home Front is solidly in back of the Fighting Front.

Need help? Need ideas? Call on the Chairman of your War Finance Committee. He's standing by.

Here's the Quota Plan:

1. Plant quotas are to be established on the basis of an *average* $100 *cash* (not maturity value) purchase per employee.
2. Regular Payroll Savings deductions made during the drive accounting period will be credited toward the plant quota.
3. Employees are expected to contribute toward raising the cash quota by buying extra 5th War Loan Bonds: 1—Outright by cash. 2—By extra installment deductions. 3—By extra installment deductions plus cash.

Example: JOHN DOE MFG. CO.—1,000 Employees

1,000 Employees x $100 . . $100,000 Cash Quota

Regular payroll deductions during the eight weekly payroll accounting periods of June and July. 30,000

$70,000 (to be raised by sales of extra Bonds).

BACK THE ATTACK—SELL MORE THAN BEFORE

The Treasury Department acknowledges with appreciation the publication of this message by

AMERICAN DYESTUFF REPORTER

★ ★ *This is an official U. S. Treasury advertisement—prepared under the auspices of Treasury Department and War Advertising Council.* ★ ★

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Givaudan-Virginia, Inc.	
Glyco Products Co., Inc.	
Hart Products Corp.	
Hercules Powder Co.	
Naval Stores Department	
Hooker Electrochemical Co.	IV
Industrial Rayon Corp.	VIII
Kali Manufacturing Co.	
Kelco Co.	
Laurel Soap Mfg. Co., Inc.	XXVIII
Leatex Chemical Co.	XXVI
Leeds & Northrup Co.	
Mathieson Alkali Works, Inc.	
National Aniline Division, Allied Chemical & Dye Corp.	XXII
National Carbon Co., Inc., Carbon Products Division	XI
National Oil Products Co.	
National Starch Products	
New Jersey Zinc Co.	
Nyanza Color & Chemical Co.	XXIV
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Pabst Sales Co.	
Perkins & Son, B. F.	
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Richmond Oil, Soap & Chemical Co., Inc.	XXVI
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Scholler Bros., Inc.	Third Cover
Socony-Vacuum Oil Co., Inc.	
Solvay Sales Corp.	XXIX
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Standard Brands, Inc.	
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Westvaco Chlorine Products Corp.	
Wolf & Co., Jacques	
Young Aniline Works	
Young Co., J. S.	XXVI
Zinsser & Co.	

THE SOLUTION IN THE TEST TUBE MAY BE THE SOLUTION TO YOUR PROBLEM

Today, when the Textile Industry is playing a more important role than ever—serving the nation on all fronts—our services may also prove increasingly important.

Must an old fabric change its characteristics to meet today's demands? Is a special finish desired to serve a purpose hitherto unheard of? Problems like these present a challenge to us—a challenge we are meeting successfully right along.

Our location in the heart of the textile area enables us to serve you with the maximum of convenience. Our modern research laboratory and our expert technical staff are always at your service. Feel free to call on us at any time . . . for our test tubes may hold the solution to your problem.

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BURKART-SCHIER CHEMICAL CO.

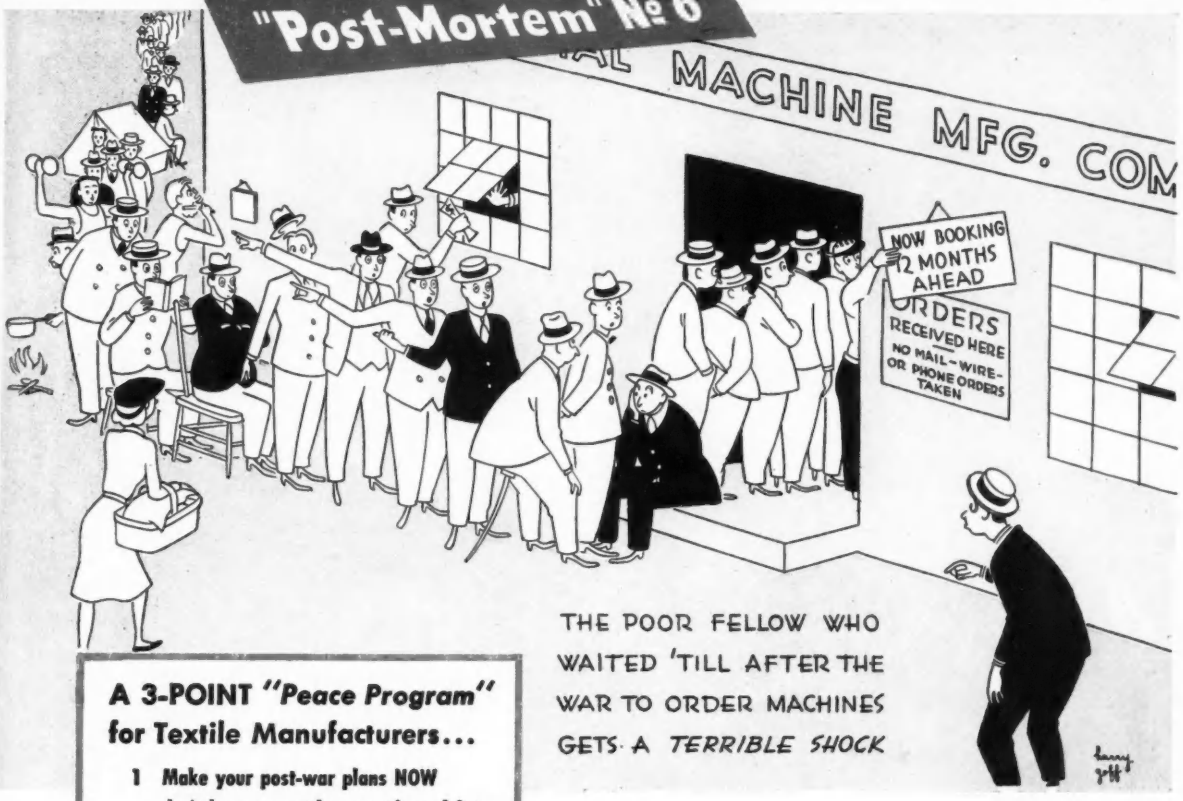
Manufacturing Chemists for the Textile Industry

CHATTANOOGA, TENNESSEE

PENETRANTS • DETERGENTS • SOFTENERS • REPELLENTS • FINISHES

FOR COTTONS-RAYONS-WOOLENS-WORSTEDS. FOR BLEACHERS-DYERS-MERCERIZERS-FINISHERS.

POST-WAR "Post-Mortem" No 6



THE POOR FELLOW WHO WAITED 'TILL AFTER THE WAR TO ORDER MACHINES GETS A *TERRIBLE SHOCK*

A 3-POINT *"Peace Program"* for Textile Manufacturers...

1 Make your post-war plans NOW
don't let peace catch you without definite plans for products, markets, sales and production.

2 Decide on new equipment needs NOW
don't wait until the war is over before making a thorough survey of your production equipment and deciding what machines must be replaced.

3 Order your new equipment NOW
don't risk serious delay in securing necessary new equipment for post-war production. Metals and other basic materials will continue to be scarce for a long time after the war ends.

If you are going to need new dyeing and finishing equipment after the war, we earnestly recommend that you place your order with us *now*. Our "Post-War Purchase Plan" assures you prompt delivery when war restrictions are lifted. Write now for complete details of this plan.

ARMY E NAVY

A large percentage of the textile machinery now in use will have to be replaced as soon as war restrictions are lifted. It takes no "crystal gazer" to foresee that the demand for new equipment after the war will far exceed the capacity of the manufacturers to produce it . . . so a lot of textile mills will have to wait their turns. That's going to work a hardship on them, because no mill can compete successfully with worn-out or obsolete equipment.

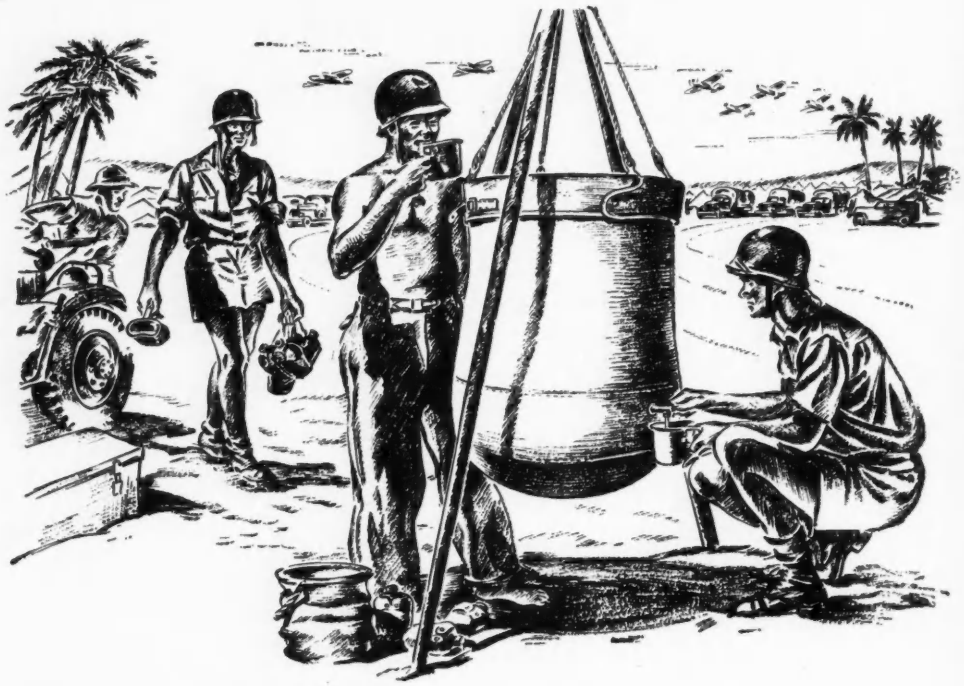
What's the solution? *Action* . . . action *right now!* No great amount of time is required for you to determine what new machines you need. Then place your orders for those machines right away! Such action *now* will put you "up in front" for delivery of needed machines soon after the war ends.

Our Post-War Purchase Plan is designed to help you make such purchases without risk. Talk it over with us.

SMITH, DRUM & COMPANY
Allegheny Avenue at 5th Street, Philadelphia 33, Pa.

SMITH-DRUM TEXTILE MACHINES

for hosiery dyeing, skein dyeing, package dyeing, beam dyeing, piece goods dyeing, package drying, skein mercerizing, warp mercerizing, hosiery inspection.



Desert Punch... Served in Cotton

Troops stationed in desert and tropical regions enjoy cool drinking water—thanks to a cotton duck water bag developed by Capt. W. L. Hicks of the Quartermaster Corps.

Formerly, bags were rubberized and water reached temperatures, under desert conditions, that made it almost undrinkable.

This new bag is made of a duck fabric treated with natural gums to simulate those found in flax. Moisture is allowed to permeate to the outside and evaporation cools water inside the bag.

Mills making this specially treated duck depend on Butterworth Machines at every step in the Wet End of Textile Finishing.

Butterworth Machines are playing their part in the battle of production—bleaching, boiling-out, drying, calendering, dyeing.

Butterworth Engineers freely offer their cooperation to mills seeking to achieve increased productive efficiency... or to repair or replace worn-out or obsolete equipment.

All of our facilities not required for Ordnance production are available to help you solve your present finishing problems, and aid you in your post war plans. Let us serve you now.

***64%**

of equipment now in use in the wet end of textile finishing cannot operate at a profit in competition with modern machines.

*Proved by Research

H. W. BUTTERWORTH & SONS CO.
Phila. 25, Pa. Serving Textile Industry since 1820
Offices in Providence, R. I. and Charlotte, N.C.
In Canada: W. J. Westaway Co., Hamilton, Ont.

Butterworth

PRODUCING GUN MOUNTS FOR THE UNITED STATES ARMY

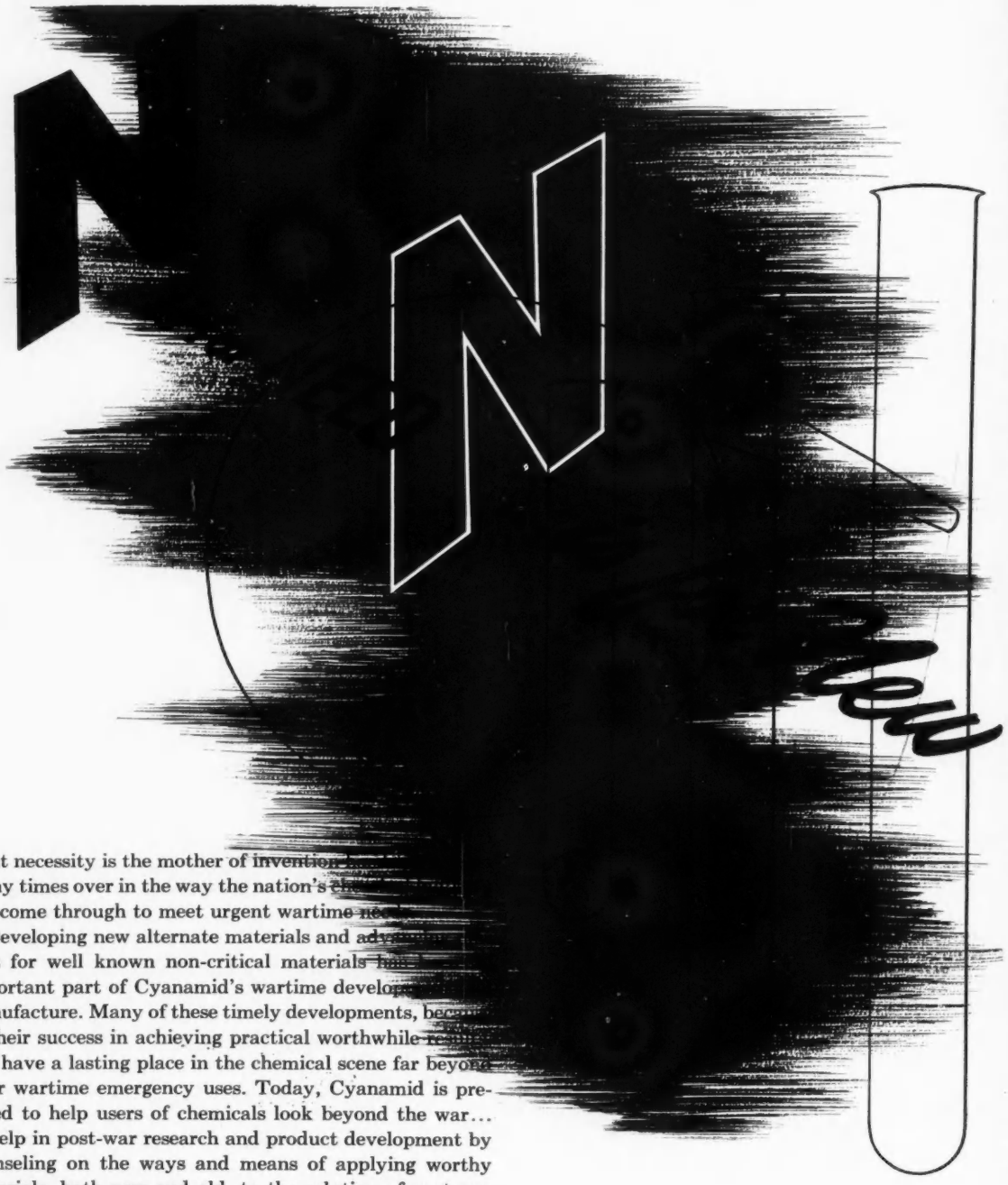
. . . in her new world of tomorrow

she will revel in the joy of again wearing sheer alluring hosiery and voluminous gowns of exquisite beauty. Gone will be all the wartime restrictions—she will know no further need to save on yardage. Yet, though she still chooses hosiery and fabrics for their loveliness, she will expect the wear and service to which she has been educated. *DuraBeau* Finishes give positive assurance of *lasting* beauty now, and in the days to come—and there is a *DuraBeau* Finish for *every* Fibre and Fabric.

DuraBeau finishes

Reg. U. S. A. and Canada

SCHOLLER BROS., INC., Mfrs. of Textile Soaps, Softeners, Oils, Finishes Collins & Westmoreland Sts., Phila. 34, Pa. St. Catharines, Ont., Can.



That necessity is the mother of invention has been proved many times over in the way the nation's chemical industry has come through to meet urgent wartime needs.

Developing new alternate materials and advancing new uses for well known non-critical materials has been an important part of Cyanamid's wartime development and manufacture. Many of these timely developments, because of their success in achieving practical worthwhile results, will have a lasting place in the chemical scene far beyond their wartime emergency uses. Today, Cyanamid is prepared to help users of chemicals look beyond the war... to help in post-war research and product development by counseling on the ways and means of applying worthy materials, both new and old, to the solution of post-war product plans.

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